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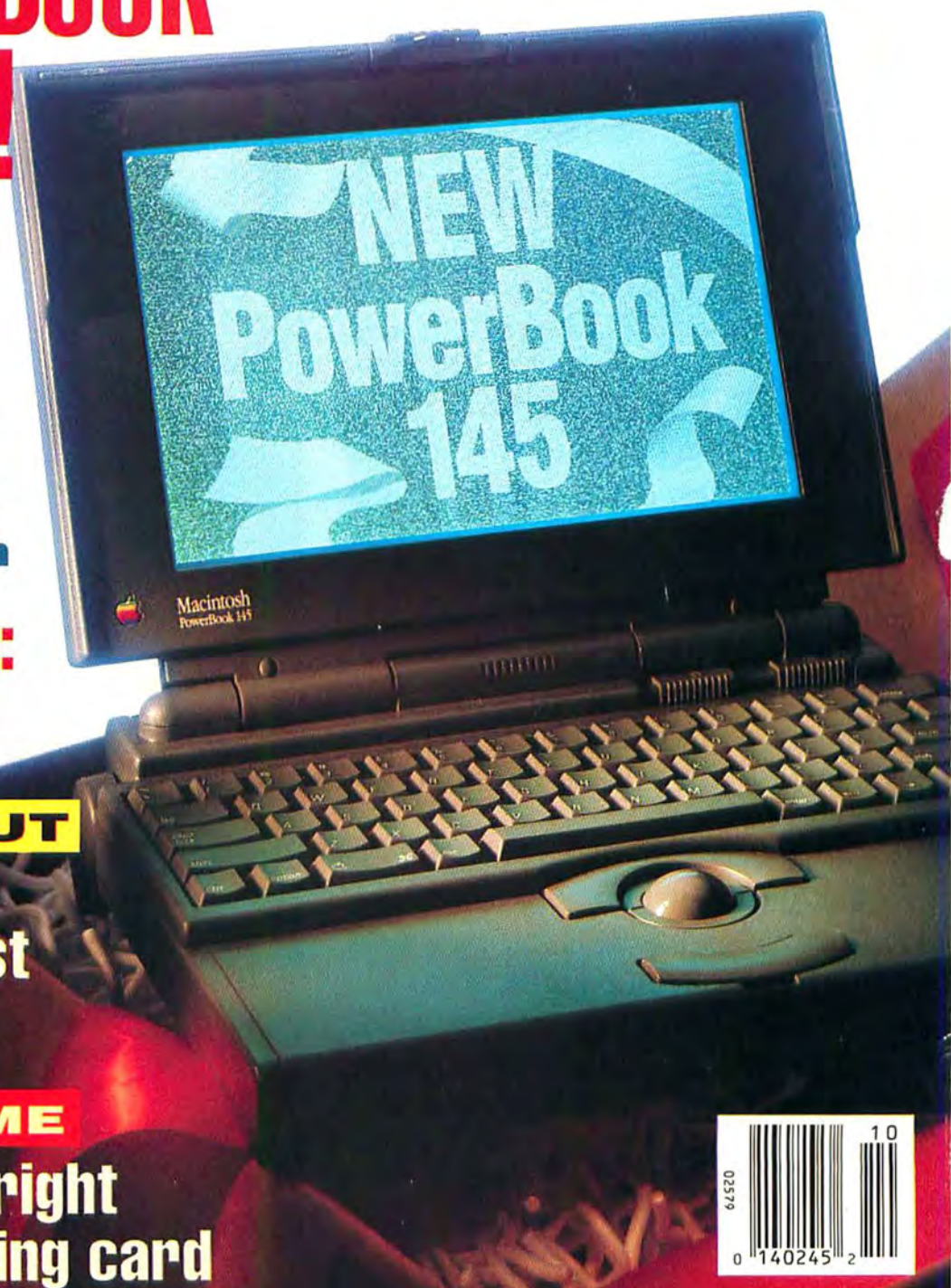

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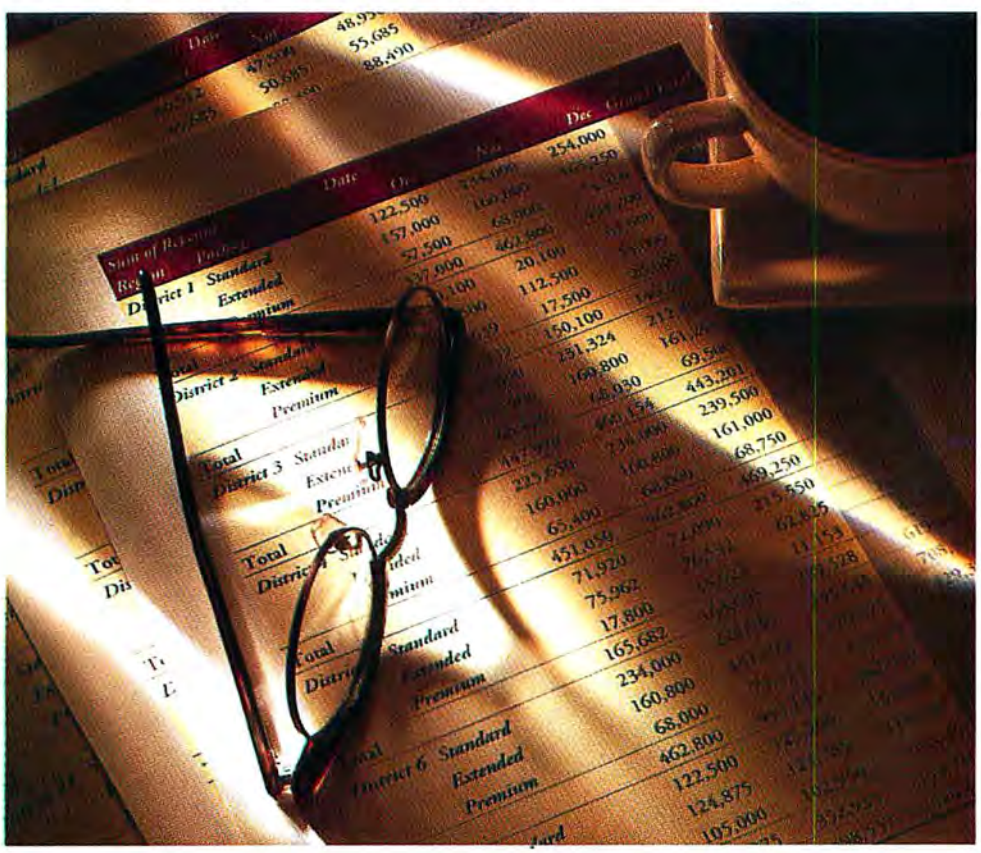

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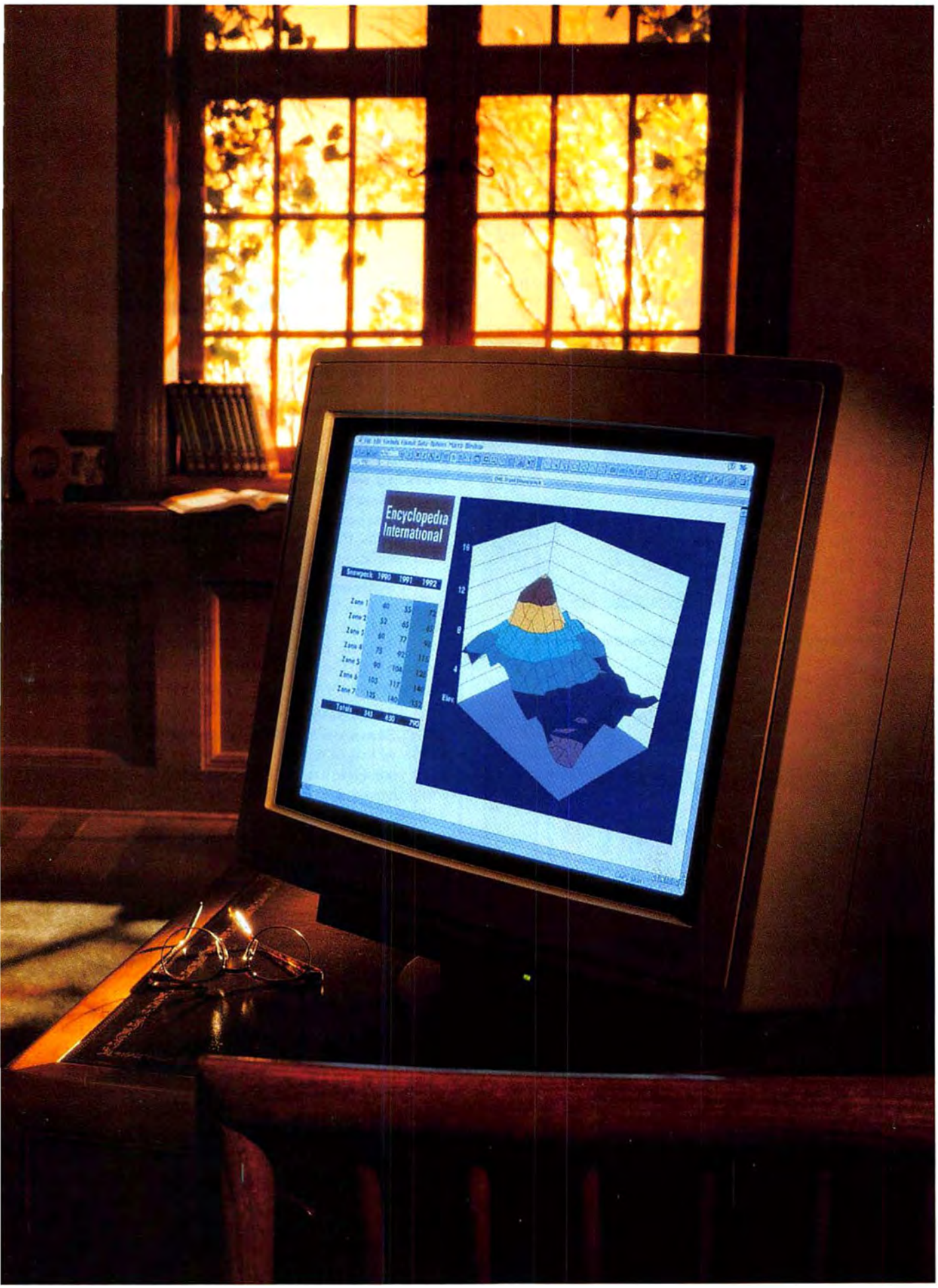
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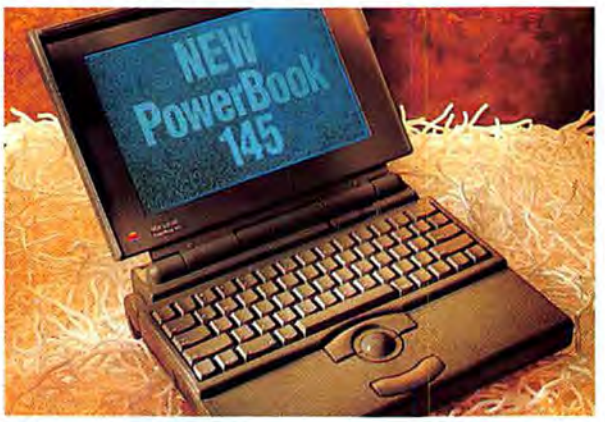

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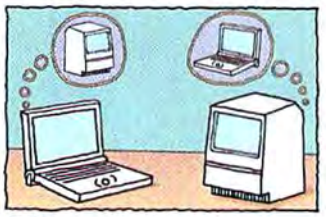

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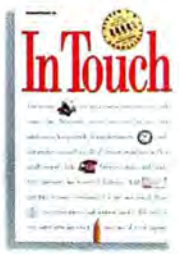

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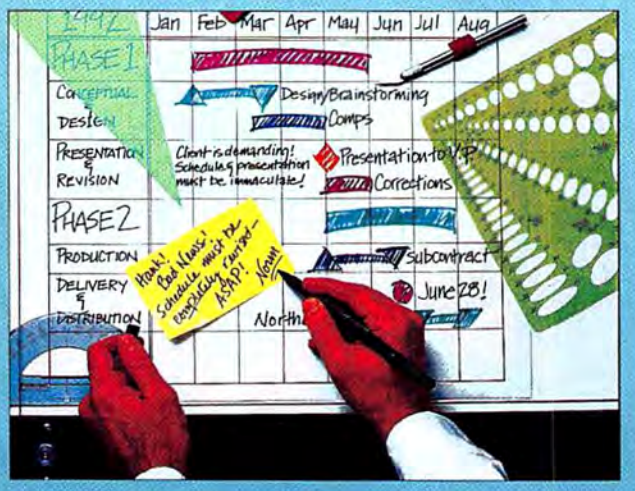

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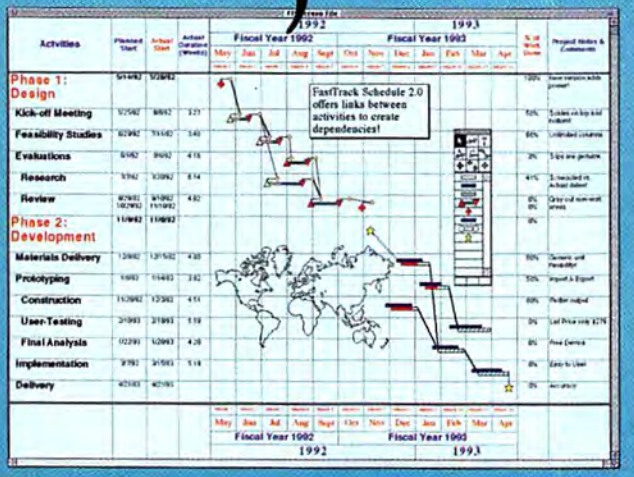

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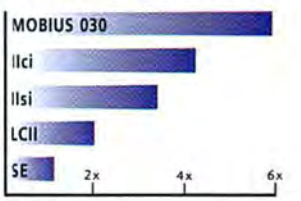

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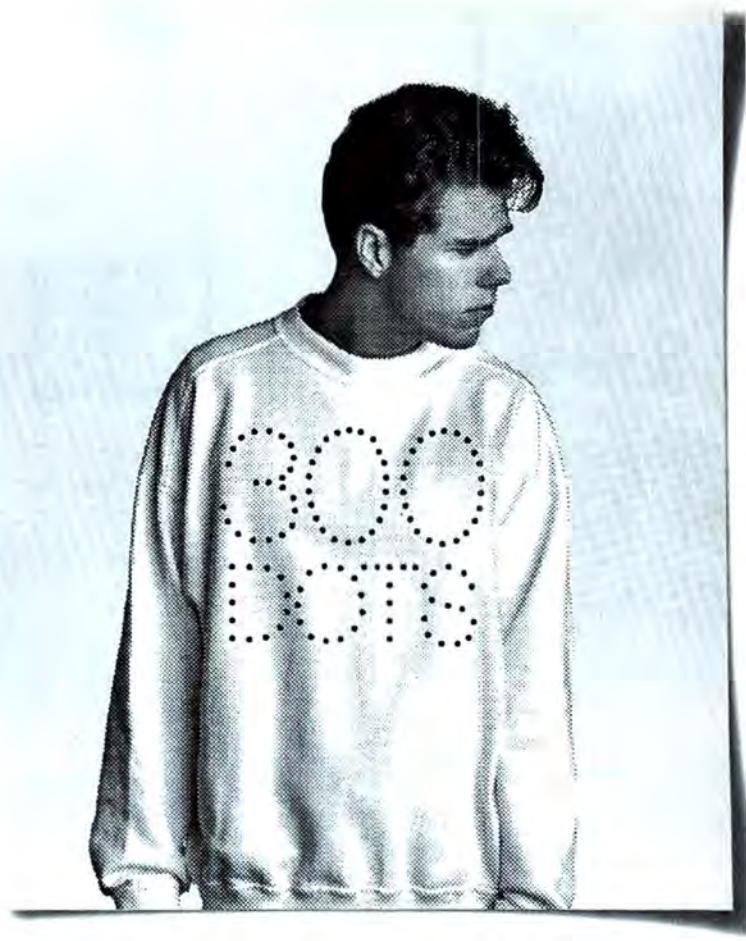

Announcing the first 600 dpi printer that's instantly compatible with your Macintosh *and* your budget: the new IBM LaserPrinter 10A.

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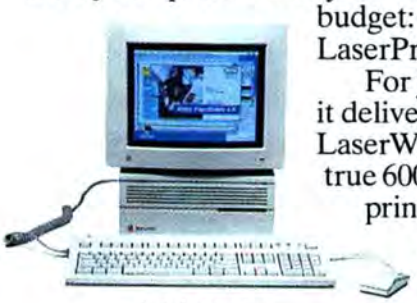

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THE NEW IBM LASERPR

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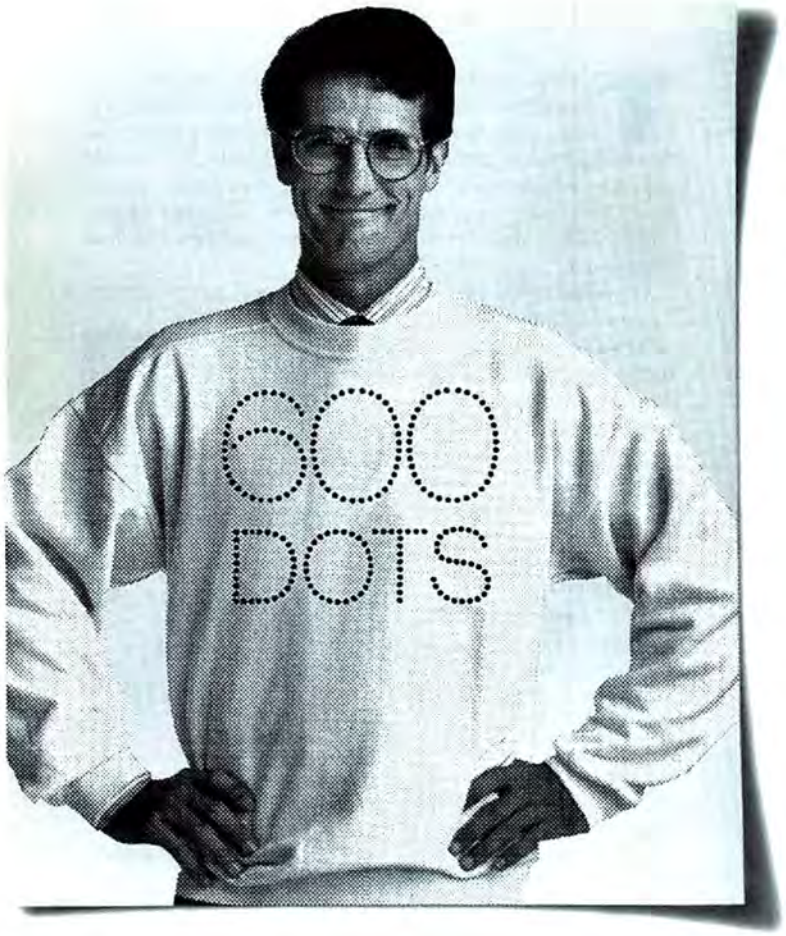

But the IBM LaserPrinter 10A gives you true 600 x 600 dpi output—for under $4000.

LaserWriter IIg

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IBM

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CIRCLE 207 ON READER SERVICE CARD.

About

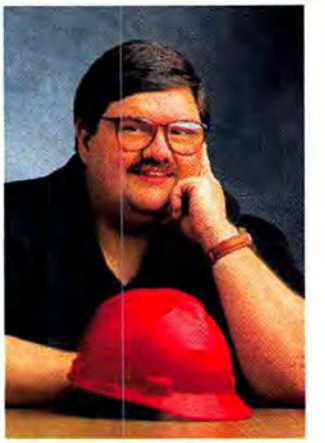
MacUser

Family Values

The Mac family is growing. The latest addition is the PowerBook 145, a smarter, faster, leaner, meaner version of the PowerBook 140 (see the cover and page 50 for the first photos of the newest kid on the block). And we can expect new additions to the Mac family in the coming months: new CPUs, new peripherals — even new categories of machines such as low-cost multimedia players and personal digital assistants.

But what about the Macintosh you already have? Just because it's a little chunkier, a bit clunkier, and a tad slower on the uptake than the latest models, is it necessary to force that old SE/30 or IIx into mandatory retirement? Just because that 128K Mac can't play QuickTime movies, does it mean you have to hide it away in the attic?

Don Crabb says no.



Don Crabb wears many hats. This month he dons another in his new Power Tools column, The Mac Workshop.

With a little care and attention — and the help of third-party hardware and software makers who've made it their mission to bring new life to old machines — that old Mac can provide many more years of service. In his new Power Tools column, The Mac Workshop, Don tells you how to keep your old Macintosh active.

In fact, says Don, older CPUs can sometimes offer capabilities that exceed those of the newest models. Don's goal each month is to hot-rod a different Mac CPU until it meets or beats the pace of the next Mac up — and at a cheaper price. This month, he shows you how to make a IIfx the equal of any Quadra.

As a Mac consultant, teacher, and software developer, Don knows whereof he writes. He has been tracking the nuclear Mac family and the extended family of third-party products since 1984. Don gets ample real-life experience with Macs as an instructional-software developer and as the director of laboratories for the Department of Computer Science at the University of Chicago (where he keeps up with other platforms by developing instructional software for IBM, Sun, and NeXT too). Some readers may know him from his Mac coverage in such forums as *InfoWorld; BYTE; MacWEEK;* and his syndicated newspaper column, "Crabb on Computers." His latest book is *MacWEEK Guide to System 7.0* (Emeryville, California: Ziff-Davis Press, 1991; $24.95).

Don wants The Mac Workshop to be a users' column: He invites you to write to him with your problems and questions about vintage Macs so he can address them in future columns. Write to Don, c/o *MacUser,* 950 Tower Lane, 18th Floor, Foster City, CA 94404, or via CompuServe at 74036,3573, and keep your Mac family together.

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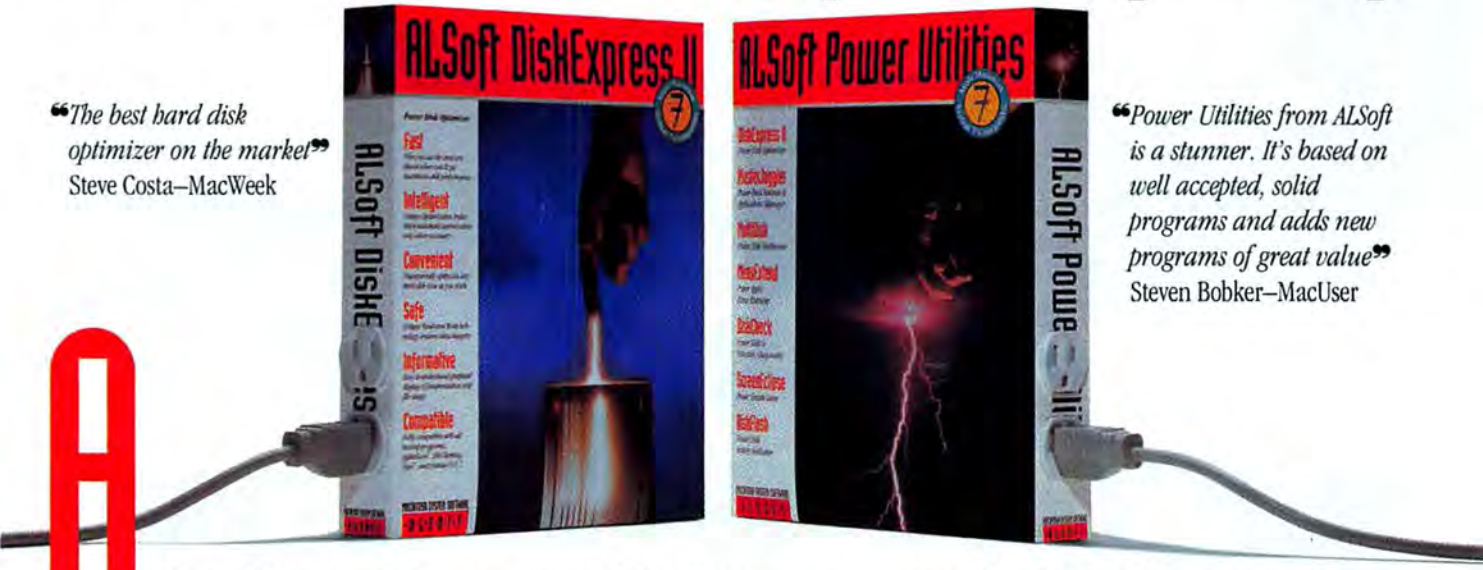
"*The best hard disk optimizer on the market*"
Steve Costa–MacWeek



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Steve Bobker–MacUser

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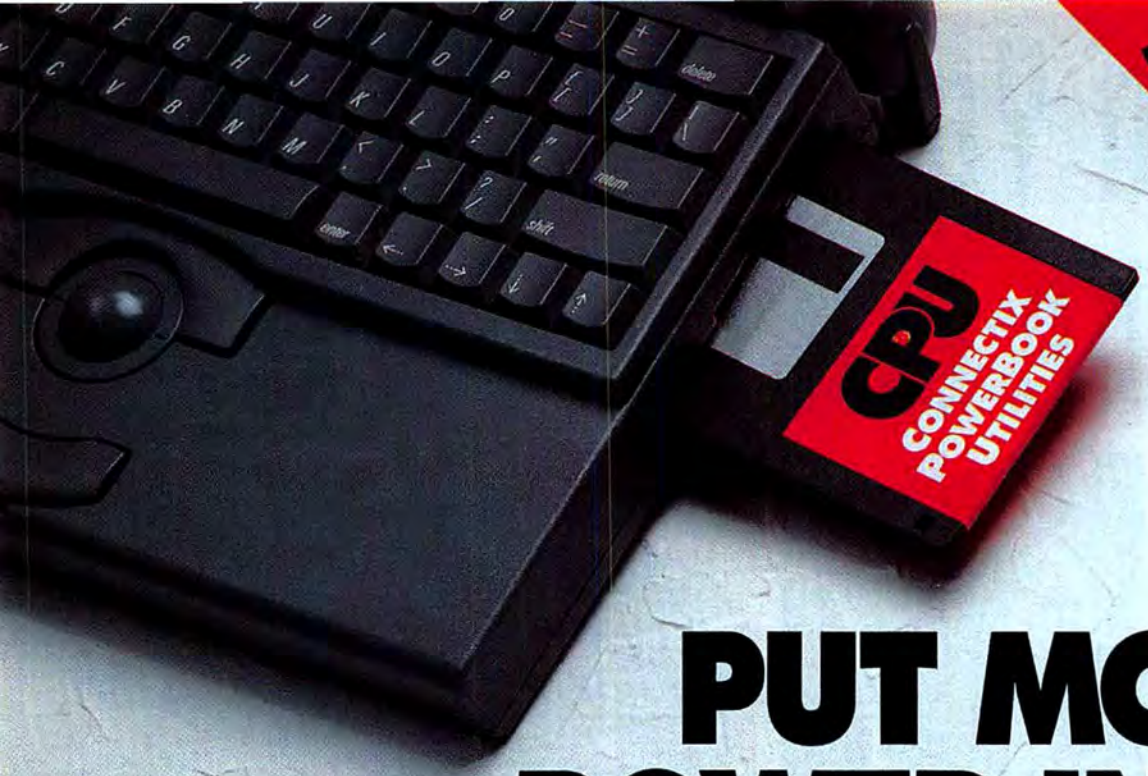

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LETTERS

Larry Martin, of Fort Bragg, California, was fascinated by senior editor Victoria von Biel's admonition to buy only CD-ROM drives that blow air out without sucking any in ("How to Buy CD-ROM Drives," July '92, page 216). Says Larry, "I'd like to know which model does this, so I can get several. I can think of many uses for such a drive besides playing CDs."

Inflating balloons? Blowing leaves off the sidewalk? Imitating the windy pronouncements of certain high-profile computer execs? Write to Letters to the Editor, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404, or post your letter on the MacUser Forum of ZiffNet/Mac, our on-line service. All letters become the property of *MacUser*, and we reserve the right to edit any letters we print. Please include a return address and a daytime phone number.

PageXPressGo

Why didn't Ready,Set,Go! 5.0 (formerly DesignStudio) garner at least a mention in your latest review of PageMaker and QuarkXPress (July '92, page 56)? QuarkXPress 3.1 and PageMaker 4.2 are being hyped for features such as scripting, color separations, file-format support, text formatting, and the ability to sort pages and balance columns. These features were in DesignStudio 2.0 two years ago.

Dean A. Spahr
Pittsburgh, PA

Your DTP face-off omitted the *most* venerable program, Ready,Set,Go! (*MacWEEK* recently called it the oldest living desktop publishing program.)

What ignorance! What bias! Are only advertisers going to get mentioned in *MacUser?*

In your March '92 issue (page 97), you gave DesignStudio 2.0 an honorable mention in the Eddy Awards and said its Separator Annex provided "the most-sophisticated internal color separations of any page-design program." As you must know, DesignStudio was recently upgraded to Ready,Set,Go! 5.0 and is now marketed by its original developer, Manhattan Graphics. Besides new features, it has a new, reduced list price of $395, and there's a toll-free number for tech support.

Henry Neufeld
New York, NY

Our review highlighted important new versions of the two leading page-layout programs; it was not a comprehensive look at the field. Ready,Set,Go! is indeed a fine (and venerable) product. Version 5.0, however, was merely a maintenance upgrade of DesignStudio 2.0, adding support for QuickDraw printers, compatibility with TrueType and System 7, and new documentation. When a major new version of RSG is released, it will receive a full review. — AA

Souped-up CPUs

Word (or WordPerfect, for that matter) cannot express my disappointment with "Blasting Off: CPU Accelerators" (June '92, page 166).

Perhaps I simply failed to notice a "for supersonic Macs only" disclaimer. Not a sidebar, not a single word about accelerators

Dear Mr. Sculley . . .

In June, we asked, **"Which Mac model offers the best balance of price and performance to suit your needs?"** The reader favorite, hands down, was the LC.

"The perfect all-around Mac" is how Robert D. Silverthorn, of South Lancaster, Massachusetts, described the LC. "It's no Quadra, but few people I know really need that much power or speed." He has only two wishes: "I'd like a cache card with attached coprocessor, and I wish the LC II could recognize the maximum 12 megabytes of RAM (instead of just 10)."

Susan Stoler, of Princeton Junction, New Jersey, bought a Mac because her children's school system uses Apple computers and she heard that the Mac was "more fun and easier to use than IBM-compatibles." She chose the LC, because "we were looking for the cheapest color Mac that could also run Apple II software."

Perhaps R. Bradley Scheetz, of Princeton, New Jersey, summed up reader sentiments best: "For any small-office or home-den atmosphere, the Macintosh LC is *the* desktop computer of the '90s." He does have one regret, however. "I didn't look into the PowerBooks. For basically the same price, I could have taken my LC with me."

Another LC owner, Laurie J. Hankins, of Tracy, California, is unhappy with the price of progress. "The LC was a great idea, but the LC II is the finished product. It has the speedier 68030 processor and can use virtual memory, and it's the same price as the LC I just bought!"

Dave Weisboard, of Gresham, Oregon, also thinks the LC II is "the best value in the Mac world." He gloated, "I saved $700 by purchasing an LC II over a comparably configured IIsi. I figured that if the LC was too slow, I could buy an accelerator and have a machine that outperforms the IIsi.

"The only real problem is that the machine has only one slot. What I really needed was a IIci, but for that price I could buy two LC IIs, hire another employee, expand my business, get rich, and retire, never needing to touch a computer again."

Apple is modularizing the Mac's operating system, making new features such as QuickTime, scripting, and speech recognition available as add-on modules rather than as part of the core system software. Some users, however, would like to extend this concept to existing system features.

Speak Up:

What built-in system capabilities would you like to see turned into optional add-on modules?

Send your thoughts to Dear Mr. Sculley, c/o MacUser, *950 Tower Lane, 18th Floor, Foster City, CA 94404.*

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CIRCLE 35 ON READER SERVICE CARD.

LETTERS

relating to the Plus, SE, SE/30, and Classic owners who have yet to experience powered flight! Or will there be a future article entitled "Rolling Downhill: Accelerators for the Rest of Us"? For owners of such lower-middle-class Macs, an accelerator may represent the only economically feasible path toward the performance required for System 7 and the other high-powered products your publication devotes most of its space to.

But wait a minute. Ignoring the many on the lower end of the economic scale while catering to the few at the top . . . . Pardon my paranoia, but has George Bush made any recent appointments to your editorial staff?

Tom Caswell
Warren, OH

Our June '92 article focused on high-end accelerators for color-capable Macs. Don't worry, though — MacUser Labs has covered accelerators for the Plus, SE, and SE/30 in the past ("Chasing the IIfx: Accelerators," August '90, page 84), and we'll be looking at them again soon. In the meantime, you can check out Don Crabb's monthly advice on beefing up older Macs in The Mac Workshop. — JP

Your article didn't mention cache cards for the IIci. Fusion Data's TokaMac ci is demonstrated to be faster than the Radius Rocket, but the Rocket is a NuBus card and the TokaMac is a cache card. So if your IIci already has a cache card, you must remove it to run the TokaMac. Is a Rocket plus cache card faster than a Rocket without? Did your IIci test unit have a cache card installed?

You say that a 50-megahertz 68030 processor should be just as fast as a 25-megahertz 68040, but your results tell a different story. Why?

Blair Sandler
San Francisco, CA

The Radius Rocket uses its own memory to run the Mac's operating system and applications, so you see little speed improvement if you leave a cache card in place. The same is true for NuBus accelerators from Applied Engineering and Impulse Technology. We therefore did not consider cache cards in our testing.

A 68030 CPU running at twice the clock speed of a 68040 should be able to process the same number of instructions as the 68040 in a given amount of time. But the 68040 has a large copy-back cache that improves its overall performance. In addition, the 68040's architecture enables it to queue instructions, providing a faster processing pipeline. — MF

I'm confused. In the "How It Works: Accelerating Your Mac" sidebar (page 168), you identify the motherboard clock on a Mac IIci. But on the other side of the SIMMs, there's an identical (but unidentified) chip labeled "40 MHz." I verified this on my IIci. The IIci clocks in at 25 megahertz, so what is this other chip?

Edward H. Clement
San Diego, CA

That crystal controls the timing for the NuBus circuitry. — JP

I want to upgrade my Mac II, but the only option I have is the Mac IIfx-board exchange. A suggestion to Apple: How about an adapter kit that upgrades a Mac II/IIx/IIfx to a Quadra 700? It could consist of a Quadra 700 motherboard and a separate six-slot NuBus extender board, both of which could be mounted in the II's bulky case. Apple might also offer the NuBus extender as a stand-alone unit for use with other Mac models that have three or fewer NuBus slots.

Steve Leski
Mission Hills, CA

Moldy Media

We were surprised at Tosoh's poor showing among the vendors of removable-media drives in "Pocket Opticals: 3.5-Inch Magneto-Optical Drives" (July '92, Buyer's Guide page 10). Your compatibility table showed that the Tosoh cartridge failed to work with the Teac 3.5-inch optical mechanism.

The Tosoh cartridge used in your tests was manufactured two years ago on our pilot production line in Tokyo. Today, however, our commercial media have no problems working with any ISO-compatible 3.5-inch drive.

Marie Wise
Sales manager
Tosoh USA
South San Francisco, CA

We tested the new Tosoh cartridge, model number TODC-3A50, and it worked fine in our Teac mechanism. — MF

Statistically Speaking

Your review of Minitab 8.2 (June '92, page 54) misses the mark. I've used Minitab on mainframes and the Mac for three years and consider version 8.2, with its pull-down menus and other new features, to be a significant improvement.

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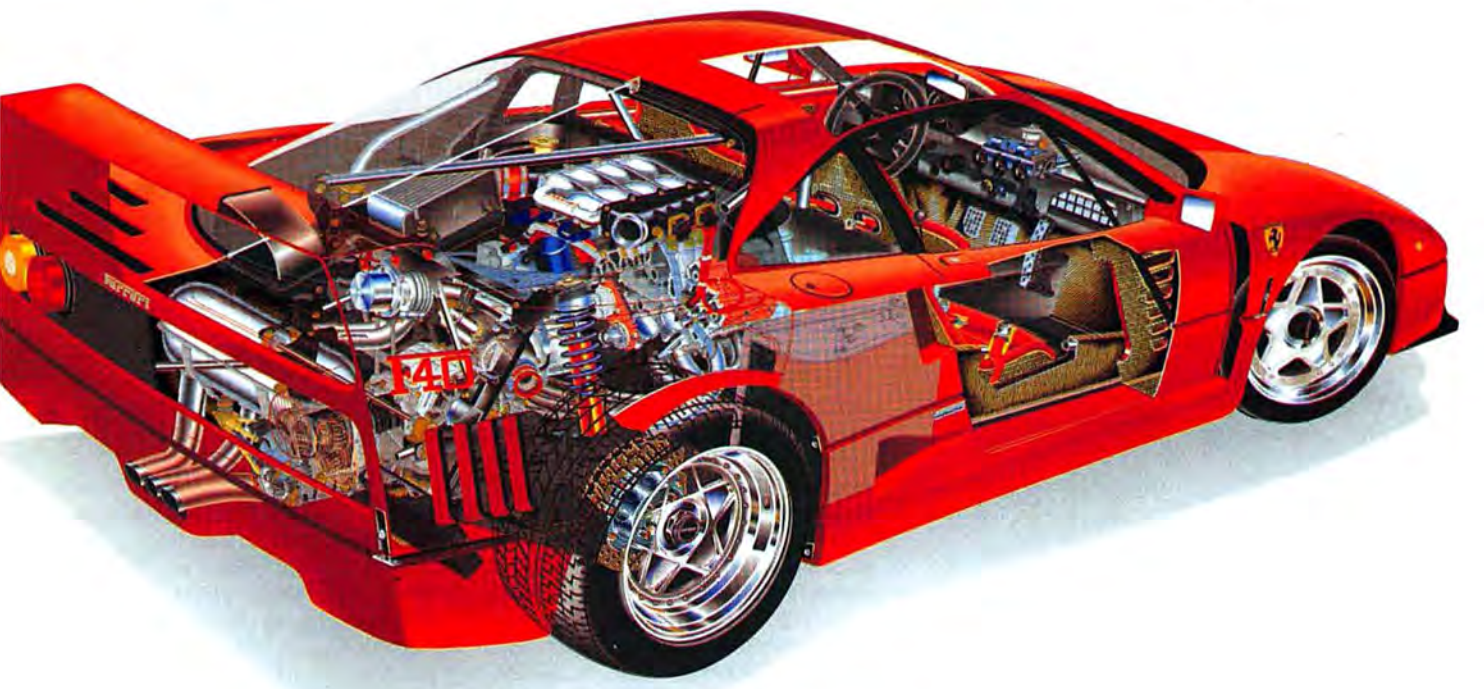

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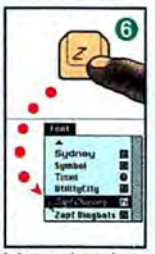

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LETTERS

Contrary to your reviewer's assessment, Minitab's scrolling Session window is a bonus, because it provides a running history of your work. You don't get that advantage with StatView. (The graphing program Igor also utilizes a history window.) I agree that Minitab's graphics are mediocre, but you can easily export data to more-sophisticated graphing programs such as KaleidaGraph. Minitab provides good support, including a useful newsletter, and the company regularly offers free macros to users.

The bottom line for many people will be the breadth and depth of Minitab's power, which StatView can't match. For example, StatView can't do weighted least-squares regression. I've played with StatView since its introduction, and in my final analysis, it's Minitab that offers Mac users the best and most comprehensive package for the money.

Bill Kolling
Iowa City, IA

In his review of Minitab, your reviewer refers to SYSTAT as a "mainframe-derivative" statistics package, like SPSS and Minitab. Nothing could be further from the truth.

Unlike SPSS or Minitab, SYSTAT was originally designed for microcomputers, including Commodores, IBM PCs and compatibles, and the Macintosh. In fact, SYSTAT released the first statistics package for the Mac in 1985. Our latest release, SYSTAT 5.2, has enhancements that support the latest Mac features, including QuickTime.

Ken Kornbluh
Director of marketing
SYSTAT, Inc.
Evanston, IL

Lotus Lover

In "New Dimensions in Spreadsheets" (June '92, Buyer's Guide page 32), you state that Lotus 1-2-3's biggest drawback is its lack of Fill Right and Fill Down commands and that the Clipboard can be used instead to perform the actions of these commands.

Using Lotus 1-2-3's Quick Copy command, however, you can perform these functions without using the Clipboard. Lotus 1-2-3 also ships with a template spreadsheet that contains macros that implement Fill Down, Fill Right, and Fill Through. Simply opening the document places these commands on the Tools menu. The commands work with 3-D ranges, can be undone, and don't disturb the Clipboard. There's also a way to get these macros to appear every time you start Lotus 1-2-3.

The more spreadsheet comparisons I read, the more I feel that Lotus 1-2-3 is the right spreadsheet for Mac users.

Alex Beaman
Cupertino, CA

Not-So-Immodest Proposals

Michael Swaine's "Eight Immodest Proposals" (June '92, page 41) was right on the money. As a physically disabled Mac user, I'm thankful for the products that exist to help me access my computer and disappointed that there aren't more.

It would be refreshing to see a company such as Apple actually use its resources and produce innovative products for the physically disabled. Easy Access and sticky keys were a nice start, but if you can't use the keyboard, they're less than useful. (To give credit where it's due, Articulate Systems did a beautiful job with Voice Navigator II.)

Melvin R. Fahnestock
Mount Joy, PA

I am pleased that Apple intends to modularize (or "kernelize," in Swaine's terminology) its system software. However, I'm less concerned with the ability to put modules *in* than the ability to take them *out*.

I run System 7 on a Mac Plus and appreciate many of the new capabilities. I would, however, dearly like to remove features I don't use that are needlessly chewing up chunks of RAM. For example, I don't need built-in file sharing, because I'm not on a network. I don't need DAL, because I don't happen to have a mainframe in the hall closet. And I got along just fine before TrueType.

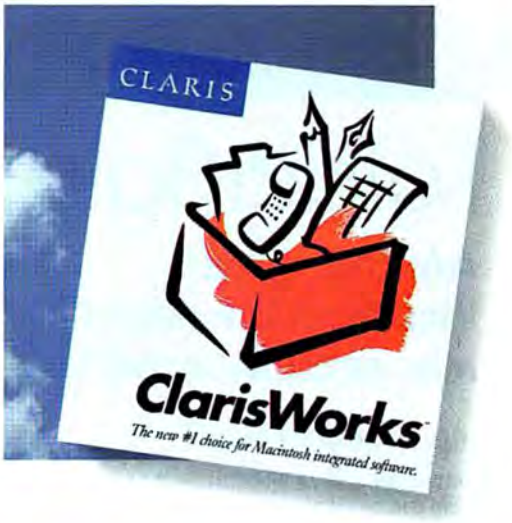
So, Apple, listen up: When you distribute those new "kernels" of system software, distribute a few old ones too.

Robert Eikel
La Jolla, CA

Michael Swaine's idea of providing multiple user interfaces for a single computer is so non-Mac that it was hard to believe I was reading it in your magazine.

I've used Microsoft Windows and find the interface inconsistency among programs to be the biggest stumbling block to productivity in that environment. The whole idea of the Mac is that I can launch an application I've never seen before and

Few things have taken off so fast.



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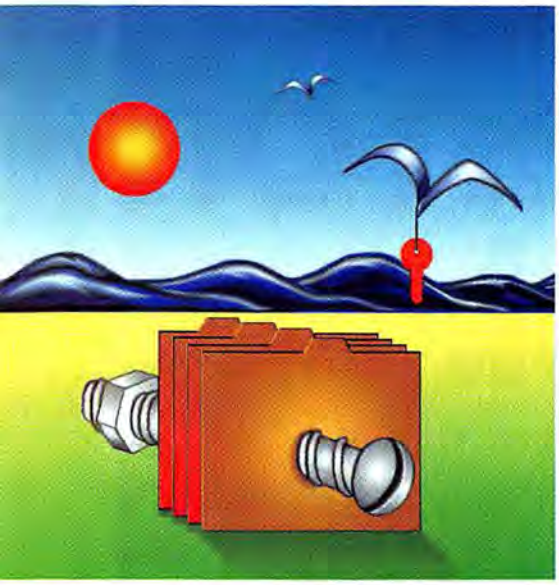

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instantly know how to work half of its functions because the interface is consistent with that of every other Mac program I've used on every other Mac.

Steve Cohn
via ZiffNet/Mac

Inferiority Complex

David Pitts' letter in your June '92 issue (page 13) asks, "Are Macintosh users so insecure that they cannot simply say that they love the Mac without having to run down PC users in the process?"

It's wrong to run down the *users*, but I'll admit that I think PCs and most things associated with them are inferior to the Mac. The people who love the Mac the most are those who have come into the fold from the PC world. These people know whereof they speak. First-time users aren't likely to know what the differences are between the two platforms.

As for our insecurity, the 80+ percent of computer owners who have PCs bash Mac users as owners of toy computers. Mac users would love to hear an admission from the PC world that, yes, the Mac is a great and viable system.

Bill Lueg
Arlington, TX

Goodbye Guy

Guy Kawasaki has a good sense of humor, a fine way with words, some rather rare and commendable values, and a refreshing view of the world ("Just Undo It," July '92, page 29). His columns were always entertaining, and — more importantly — often moving. Because little else in your magazine is moving or provokes much reflection on my part (nor do I expect it to), I looked forward to his columns and was often touched by his thoughts.

Larry Rabinowitz
Sarasota, FL

Guy's column was the first one I read each month and, in busy months, often the only column I read. He managed to make human and funny an environment that is inherently neither. The only problem that I ever had with his column was that it was too short.

Cydney Yerushalmi
Orlando, FL

Thank you for giving Guy Kawasaki a forum to remind us of truths that will still be à la mode when our Macs are only so many piles of *plastique* and microchips.

In an effort to encourage Guy in his desire to learn French, let me suggest that one of the greatest compliments one can receive in French is "*Il ne se prend pas trop au sérieux.*"

Tom McCullough
Royal Oak, MI

I am aghast; I am crushed; I am depressed; I am puzzled; I am mad! What is wrong with the Kawasaki visage appearing in more than one place? Give your readers a break, and explain your reasoning.

Mary C. Bucholtz
Evanston, IL

MacUser*'s primary charter is to help readers make product-purchase decisions by providing objective evaluations and lab tests. Although Guy never used his column to promote any of the many products and companies with which he is involved, we felt that any* perception *of a conflict of interest would be just as hazardous to our readers' ability to trust* MacUser*'s objectivity as an* actual *conflict of interest. It was Guy's decision to give up his column, and we too miss his monthly wit and insights. — JZ*

Clarifications

After we went to press with the August issue, Aldus changed the name of its new drawing package to IntelliDraw ("Intelligent Drawing," page 42). The $299 package is available from the Aldus Consumer Division (formerly Silicon Beach Software) at 619-695-6956.

Due to an editing error, our August '92 review of Pixar's ShowPlace/MacRenderMan (page 58) gave misleading information about the included documentation. The floppy-disk package does include a full set of printed manuals and a training tape; the CD-ROM version, however, comes only with disc-based documentation (which users can print). Both packages have been reduced in price: The floppy-disk package is now $695; the CD-ROM version is $495.

Our August lab report, "Perfection for Pennies: Autosynchronous Monitors" (page 158), contained two incorrect phone numbers. The non-toll-free number for inquiries about Mitsubishi's Diamond Pro 14 monitor is 714-220-2500. To talk to Panasonic about the PanaSync C1395, call 201-348-7000.

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Tammy M. Johnson
Xerox Account Representative

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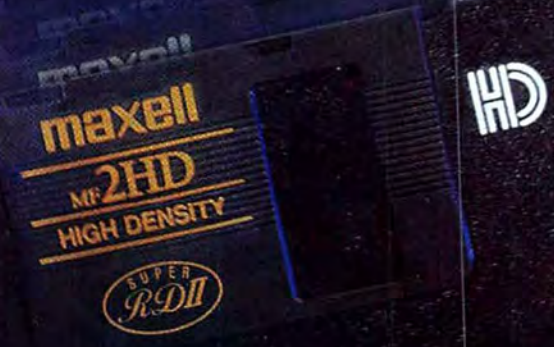

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JON ZILBER

The Era of Our Ways

Is your Mac living in the past? Are you working harder than your software? It's time to move up from the Stone Age to the New Age.

The term *New Age* is nothing new — at least when it comes to music, philosophy, or the California life-style. Here in Silicon Valley, supermarkets now devote aisle after aisle to everything from organic earth-tone salad mix to snack chips made from vegetables you never knew existed in colors you've never eaten before.

A New Age philosophy is now beginning to penetrate the software market, and the results will be just as intriguing. Here's how the New Age of software will transform everything from word processors to spreadsheets to E-mail to clip art.

The Age of 'Lightenment

In the New Age, the feature wars are over.

Over the years, market rivals kept topping each other with just one more menu, just one more handful of features, and just a slightly higher price to pay for it all. Suddenly every self-respecting software package ships on at least six floppies, comes with at least three manuals, requires at least 5 megabytes of RAM, and costs even more than the new hard drive you had to buy just to store all this new software.

The New Age Approach. Software will emphasize usability over gargantuan feature sets so users can find and master just the features they need. Users will experience net productivity gains, thanks to a shorter learning curve and the ease of creating the most-frequently-used kinds of documents.

The Nexus Generation

If you think word-processing software is for creating and editing text documents such as letters, memos, and reports, you're living in the Stone Age. Today's word processors do just about everything page-layout software used to do. But tomorrow's word processors will follow a different drummer.

The New Age Approach. Your word processor will become the nexus of all your document-management functions. You'll use it as a database for storing related documents. Your word processor will replace your dedicated electronic-mail application as the central hub for incoming and outgoing messages. It's where you'll convert documents received in one mode (such as E-mail) to another (such as speech) and edit, store, retrieve, and forward them.

E-mail will simply become a menu choice in your word processor, along with options for OCR (optical character recognition) and speech synthesis (and eventually speech recognition).

Using your word processor's OCR module, you'll be able to convert incoming faxes into text documents. And using its speech-synthesis module, you'll be able to convert a text document into speech. In the New Age, you'll have your word processor call up your colleague's voice mail and leave a message after the tone.

You'll also use your word processor as a document-finishing station, to provide spell checking, grammar checking, and style checking for everything from database records to typographic labels in graphics documents.

Brother, Can You Paradigm?

The spreadsheet paradigm — mapping all the information in your world into nice, neat rows and columns — is about to undergo its first major change: growing from two dimensions (rows and columns) into multi-dimensional structures.

What turned spreadsheets from an obscure little gimmick used only by CPAs into the driving force that brought personal computers into the business world? Two words: "what if?"

What if . . . our forecasts change? What if . . . our costs go up? What if . . . assembly line 3 breaks down?

What-if games were supposed to help you explore the big picture. But instead, spreadsheet jockeys wound up spending most of their time playing a different kind of what-if game:

What if . . . you feel like spending all weekend tweaking your spreadsheet to get it to work?

Even if you manage to get your spreadsheet model thoroughly debugged, spreadsheets still only let you play what-if with your numbers. They don't do anything for the *structure* of your data.

The New Age Approach. Real-life data isn't two-dimensional; it doesn't fit into rows and columns. Rows and columns let you sort sales data by month. But you want to slice your sales data by month *and* by district. *And* by product. *And* by whether or not the salesperson in that territory made the quota for the last three months. *And* so on.

Multidimensional spreadsheet programs that make it simple to do this will sweep the market.

The Information Rage

You buy a hammer because you want to nudge some nails — not because you like hammers. You buy a desk because you want to keep things in your office at a convenient height — not because you enjoy debating the finer points of deskness with your friends.

You buy tools because you want a solution — not because you want the tools. But most software packages are tools, not solutions. Wouldn't you really rather just get the solution?

Why reinvent basic business letters and contracts? Why not just *get* the business letters? Instead of buying graphics software to create images from scratch, you can buy libraries of clip art. And instead of building your own spreadsheet analysis from scratch, you can purchase or access enormous statistical databases that offer direct and immediate answers to your questions.

The New Age Approach. The clip-art phenomenon has already spread to all types of packaged-multimedia products — clip sound, clip animation, and the like. But it will also spread into packaged-information products: text documents, statistical databases, and so on. New Age word processors will come bundled with 100 standard business letters, spreadsheet programs with business-plan templates, and so on.

The Add-On Eon

The software business has become a game of capturing market share. Software publishers often don't make any money on the initial sale of a package, what with mail-order deep discounts and competitive ("send us the title page from any printed matter and we'll extend this special price available only to a select few") upgrades.

The trick is to make money on after-market products and services. The most traditional after-market product is the upgrade; that $99 software bargain could easily end up costing you several hundred dollars in upgrades over the next couple of years (see Andy Ihnatko's column this month for more on the steep price of upgrades).

The New Age Approach. Instead of hitting customers with unpredictable upgrade fees, software publishers will offer fixed-fee subscription services, which will entitle users to any upgrades issued during the designated time period. Other services — priority tech support, training and classes, add-on disk-of-the-month subscriptions — will provide additional opportunities for generating revenues without misleading or surprising consumers with hidden costs.

Not every New Age movement is perfect (die-hard opponents of New Age music pronounce it as one word: *newage*, to rhyme with *sewage*). But software's New Age might be just what your Mac needs to live and thrive long into a ripe old age.

Anti-virus software that's tough on viruses, not on you.

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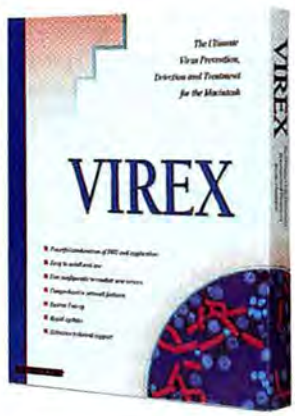

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CIRCLE 107 ON READER SERVICE CARD.

ANDY IHNATKO

Upgrade Mobility

Spent more on upgrades than the original cost of your software? How can you tell if an upgrade will be worth the money — or the hassles? Try these tips for making the upgrade.

Much as you might wish otherwise, you must at times face the realization that what was once powerful and top-of-the-line is now showing its age; what was once fast and sleek has become slow and unwieldy; what once had your unflagging support now gives you the nagging feeling that the glory days are gone, the patches and fixes are no longer working, and it's time for some fresh blood.

But enough about the Celtics. Let's talk about upgrading software.

The first question, in upgrades as in much of life, is, Why even bother? You need to do some real thinking before writing that check.

Know what you're buying. Typically, a major upgrade to a software package adds boatloads of minor new features. But are they features you *need?* When you consider the sheer number of commercial applications you have on your hard disk, you realize that the zombielike ordering of every upgrade that comes along can become a woefully expensive habit.

Scrutinize the list of new features. Yes, DiscoWriter 4.0's new full support for QuickTime looks way cool when you see some rented stooge demonstrate it at a trade show, but do you have any real use for full-motion video? With sound? In a *word-processing document?*

You're not just wasting money for unused features, either. Those new features hog disk space and memory and slow your Mac down. The new edition of the software you know and love was written with the current Mac models in mind and may be next to unusable on your trusty old Mac II or SE.

Know what you're not getting. You want conclusive proof that all those chemicals in nationally advertised, highly caffeinated diet colas can have a serious impact on the brain's reasoning capacity? Get a load of this: Software designers sometimes actually *remove* features from a program as they're rolling the new version together.

The most damaging — and widespread — example of this practice is an application that can read in files created by older versions but can't *save* in the older file format. Word 5.0 can export files in Word 3.0 format, two MacWrite formats, and *five* DOS formats, but try to find the menu option for saving a file as a Word 4.0 document, and you'll be mousing dead air. If a Word 4.0 user gives you a document for editing, you'll have no way of handing the document back in 4.0 format; you'll have to transform it into a prehistoric 3.0 file.

The justification for this archaism is that a doc created with the latest and greatest version of a program may contain an element or two that older versions won't know how to deal with — QuickTime movies and voice annotation, for example. Still, every program should be able to open documents created with older software *and somehow save those same documents in their native format.* If it can't, you should have the right to go to the programmers' homes and run over their mailboxes. Which is probably why companies rarely print anyone's home address in a software manual.

Know what you might wind up with. As it says in *We Will Hurt You and We Are Not Sorry* (the software industry's secret handbook on corporate/user relations), "The best way to fully debug a program is to put that puppy into shrink-wrap and sell 10,000 to 20,000 units." No matter how thoroughly a program has been tested in-house, potentially lethal bugs always lurk about and don't bubble to the surface until thousands of people start installing and using the program from day to day.

Take a lesson from the penguins, who gather at water's edge and shove in one or two of their feathered friends to test for killer whales. Let the pioneers who upgraded right away suffer the slings and arrows of outrageous system crashes; if you swoop in a month or so later, a new version with all those nasty bugs firmly squashed will probably be available.

These last two examples nicely illustrate one of the Fourteen Pillars of Remaining a Happy Consumer: *Never* discard an application just because you've upgraded to a more recent version. With Word 4.0 on your hard disk, you can nicely deal with incoming and outgoing Word 4.0 documents. When you discover that DiscoWriter 4.0 causes your Mac's monitor to spin around and spit pea soup through the disk drive, you can fall back to 3.9999~ until a fix becomes available or an exorcist can be hurled down a flight of cement stairs.

And who knows? Someday there might be circumstances in which you'll discover that you prefer the older version. Me, I keep PageMaker 3.0 right next to the latest version on my hard disk. Version 3.0 doesn't

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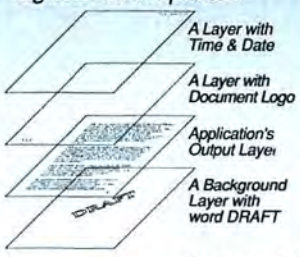
LaserMerge puts layers together at the printer!



For each of 63 layers you control:

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LaserMerge works on Macintosh Plus and up, and with all applications using the standard print manager and System 6 or 7. LaserMerge, the LaserMerge logo, and the MindGate logo are trademarks of MindGate.
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CIRCLE 42 ON READER SERVICE CARD.

have anywhere near the feature set of 4.2, but it runs with feline speed on my paleolithic-era Macintosh; I can go make myself a bowl of hearty chowder in the time it takes 4.2 to place a big multipage article.

Warning: Steep Upgrade

For the sake of argument, let's say that you're still hot for DiscoWriter 4.0. The easy way to upgrade is to pay whatever Disco Computer Industries and Haircuts Ltd. is asking for the upgrade and wait patiently by the mailbox.

What's a fair price? You should be entitled to a free upgrade if you bought

Look into competitive upgrades: Many vendors will sell you their product for a fraction of list price if you send them a competitor's "pelt."

the immediately previous version within the past two or three months. Companies that refuse to give you a freebie under those circumstances usually cave in when you call them up and give them the tongue-lashing they so richly deserve.

Maintenance upgrades (ones that fix bugs) should also be free (except possibly for a nominal disk-duplication and postage fee, no more than five to ten bucks) to all registered users. Rather than release an entire multidisk replacement set, publishers usually send you a program that opens up an existing copy of the software and adds and removes resources to transmogrify it into the newer version.

These "updater" programs are also usually available on-line free of charge — except for the usual connect charges — from services such as ZiffNet/Mac, America Online, or your local BBS.

In most cases, publishers name their price. Most upgrade fees are less than $100; three-digit upgrade fees seem to have a mystical connotation that causes users to rise up in revolt and switch to a competitor's program. More than one long-entrenched program has met its doom because its vendor charged long-time users $200 and up for an upgrade; it was the final push over the cliff that led them to look elsewhere.

If you want to save a bunch of money, look into competitive upgrades. It's become a popular marketing strategy: Instead of paying $130 for DiscoWriter 4.0, you can get the maker of LambadaWord to send you the newest version of *its* word processor for a fraction of its list price by sending the company a DiscoWriter "pelt" (a master disk or the manual's title page). It's an attractive deal, provided, of course, that LambadaWord isn't a dog and that you prefer its features to DiscoWriter's.

A neat (for you) aspect of the competitive upgrade is the fact (confirmed by a slew of phone calls) that the manufacturer really doesn't care *where* you get that pelt from. Even if you send the cover page from a five-year-old copy of WriteNow you bought at a flea market for five bucks, the manufacturer will still sell you a $350 copy of LambadaWord for $99.

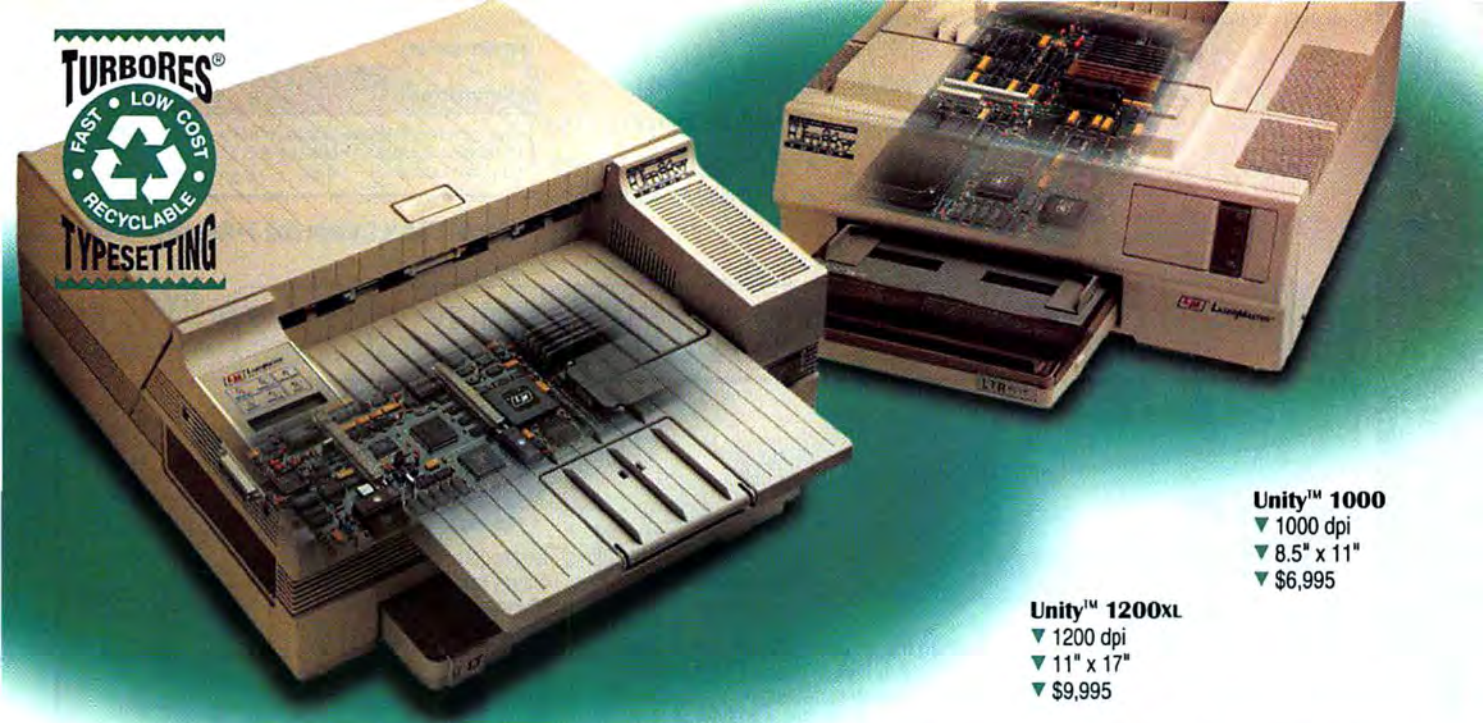
My Two Cents' Worth

Maintaining close contact with software companies is a must for getting the most for your money. The next time you set your registration card aside without mailing it in, consider that companies usually inform registered users well in advance about future upgrades and special deals; indeed, many companies are nice enough to mail entire unsolicited product upgrades, as soon as they're available, to all their registered users.

Never be afraid to pick up the phone and ask pointed questions about upgrades. It's your money, so *don't be an easy sell.* Force the company to soundly convince you that the next upgrade is worth the dough.

And don't be afraid to just ask, "What's the cheapest upgrade path?" Often this approach shakes loose special deals for developers, or educators, or other special groups. But if a company still charges more than $100 for an upgrade, it's in your best interest to start looking at other packages.

If you feel cheated by your current software and can voice your dissatisfaction in a calm, thorough manner, many companies will upgrade you for free. It's also your only hope of affecting what goes into the *next* upgrade. Although the software industry has its share of weasels, just as many companies pay fanatical attention to their users and cultivate a permanent user base by treating their customers right.



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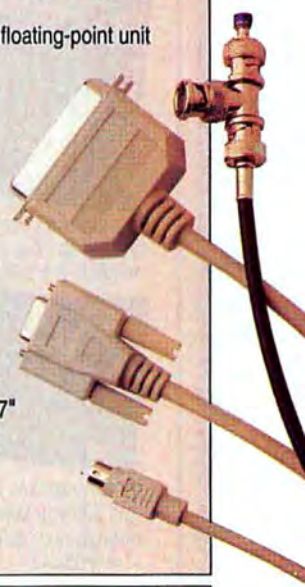

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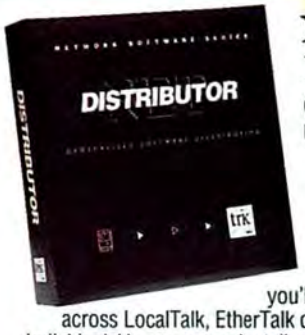

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05367	330	3.5	Fujitsu	12	4.0-5.0	1318	3.2
05366	520	3.5	Fujitsu	12	4.0-5.0	1538	4.3
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	Mac II, IIx,IIcx, IIci	8	80	32	03584	4	137
	Mac II, IIx,IIcx, IIci	8	80	64	00848	8	499
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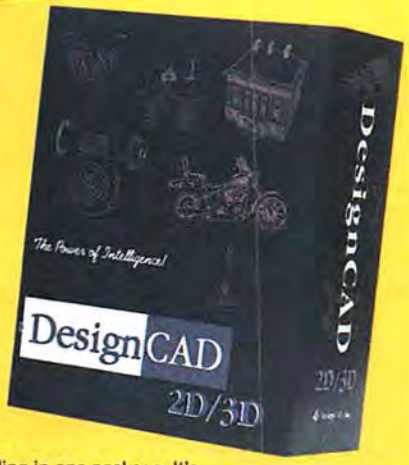

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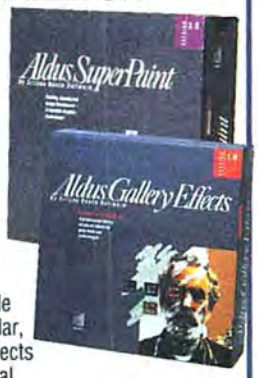

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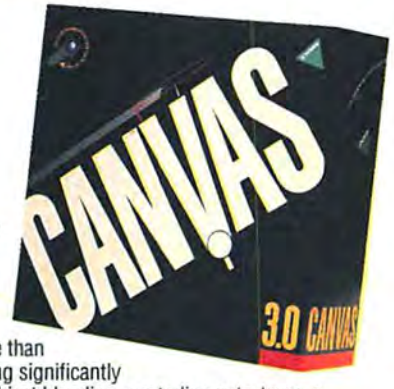

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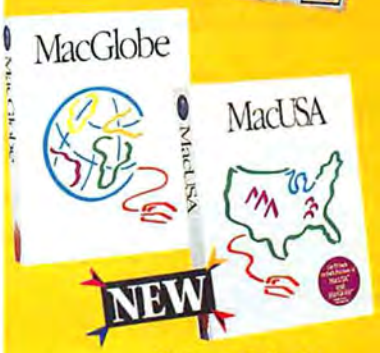

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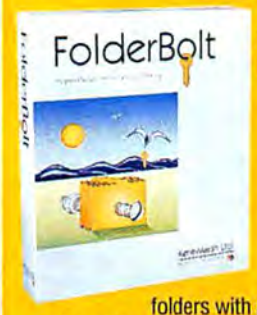

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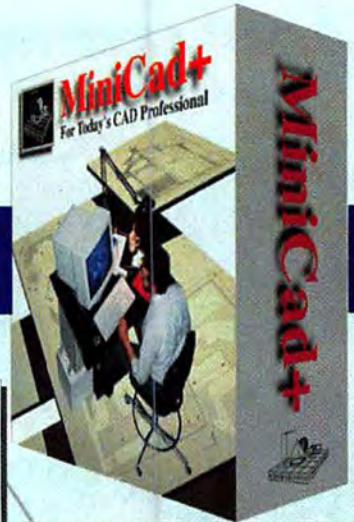

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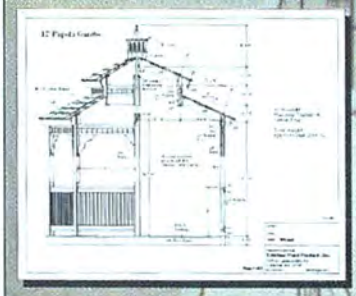

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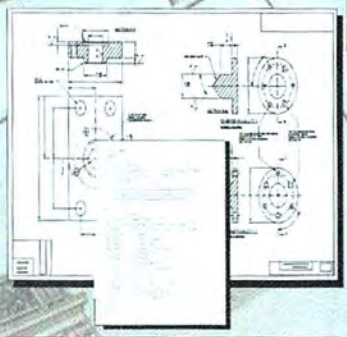

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MICHAEL SWAINE

Irreconcilable Differences

The Newton's user interface is utterly incompatible with anything else on earth — and that's *good* news for the Mac's future.

Apple recently held a press conference with Microsoft, its biggest independent software vendor and its fiercest system-software competitor. Call them arch allies, if you will. The point was to convince customers that the incompatibility of the companies wouldn't lead to (further) incompatibilities between their products. This is a column about compatibility.

Laura and Bill thought they were compatible. They lived together and worked together, running a successful computer company back in the late '70s and early '80s. Bill was the technical manager of Arrow Computer; Laura took care of the business side. And business was good, seeming destined to grow like kudzu. Weren't they in the most exciting industry in the world? Wasn't the economy healthy? Being both life and business partners was a challenge, but they were making a go of it.

Then everything seemed to go wrong. IBM introduced a personal computer, and everyone started talking about the coming shakeout in hardware companies. And something went bad between Laura and Bill. Bill left to start his own company, and Laura, staying behind to run Arrow Computer, pushed engineering to deliver a machine that could coexist peacefully with IBM's new PC.

I covered the press conference at which the Arrow machine was unveiled. Laura was the CEO of the company now, and her newly hired president was charged with demonstrating a machine he may not have known a lot about. At one point in the demo, those of us in the front row heard Laura's whispered prompt from the wings: "Don't forget the IBM compatibility."

Polymorphous Perversity

Arrow's new machines weren't enough. The predicted shakeout happened, and a lot of computer companies, including Arrow, went away. Laura has since remarried and left the business. Those companies that failed were mostly "IBM-compatible." Those that survived were mostly "100-percent IBM-compatible." Apple, under the leadership of Steve Jobs, was virtually alone in disdaining IBM compatibility.

The difference between "IBM-compatible" and "100-percent IBM-compatible" is unimportant today, even to PC types, but it once was the difference between survival and oblivion.

A decade later, compatibility, which is neither unimportant nor simple, is the family-values issue of the computer industry. But it's a different kind of compatibility: not so much the traditional computer-industry family structure of Big Mama and the Munchkins (IBM and the Seven Dwarfs, IBM and the Cut-Rate Clones, Apple and the Well-Behaved Application Vendors) but a kind of polymorphous perversity in which everything is supposed to mate with everything else. It's a multiplatformable, interoperable world, or at least it wants to be.

Actually, a lot of the incompatibility problems have been solved. When IBM introduced that first PC in 1981, it offered a choice of three incompatible operating systems but soon settled on one, and although some IBMers today may believe that it made the wrong choice, at least the decision reduced the confusion. Or take disk formats. More than a decade ago, no two computers used the same disk format. There were even different sizes of floppy disks. Today — why, we've *almost* solved that one.

Still, there seem to be more opportunities for incompatibility today than ever before. And why is Jean-Louis Gassée arguing that the utter incompatibility of the Newton user interface with anything else on earth is a good thing? What *is* compatibility, anyway?

You're Not My Pipe

Here's my answer: There are two kinds of compatibility. One kind has to do with *suitability*, the other with *substitutability*.

The first kind of compatibility — the suitability kind — is like plumbing. In real plumbing, when you say "1½-inch-diameter, female connector," you've said it all. (Or I think you have; as recent experience teaches me, I'm beyond my depth under the sink.) But then, you probably don't take your pipes to Europe, where standard sizes are measured in centimeters. And not even I would try to hook up my vacuum cleaner to my sink drain. Computer plumbing has a greater need than real plumbing for standardization in its conduits, and yet it has much less — every new computer model is apparently required to have at least one hole in the back that nothing you own plugs in to. (In that, it *is* like my sink.)

But progress has occurred: There are now a few affordable monitors that can be hooked up to either a Mac or a PC. Let's see, the first

modular Mac came out in 1987, so that brilliant innovation in compatibility took only five years.

When it comes to hooking one *computer* up to another, however, you'd better not expect such prompt action. The matter is complicated. *MacUser* has invested millions of dollars in lab space, equipment, and expertise in order to evaluate this kind of pipe compatibility. And don't think that Taligent, Kaleida, and other Apple/IBM cooperative efforts will make everything work with everything, thrilled though you may be about the OS/2 version of AppleTalk.

So-called enterprise computing — so boring a buzzword it could have been coined by the Franklin Mint — aims to perfect networks by ironing out the knots, but whether it'll succeed, only time will tell.

Then there's the ultimate pipe dream: making programs talk to one another. Interapplication communication is not just a dream; many people are using it now. Interactive Physics II, from Knowledge Revolution, lets you set up an ongoing physics demonstration and pipe its results, *as they are generated,* into a spreadsheet or other mathematical program for analysis, using the dynamic-linking capability that Apple calls publish-and-subscribe. UserLand Frontier's ability to work with PageMaker and other applications lets users drive an application from the outside to generate data and produce sophisticated reports.

But the dream is more far-reaching than this. One version of the dream is that your document will be the center of things and applications will be little tools invoked silently by your desire for some particular function. You won't have to invoke applications directly, and you may not even be aware of which application is doing your bidding. The dream is also one of small, focused applications, and you can see from the advertisements in this issue of *MacUser* how rapidly we're moving toward that goal.

There are reasons why progress is so slow. Reaching this goal more or less requires that everything ever done in software be done over again, with more-difficult methods.

Newton Clones

The second definition of compatibility is that you can take a disk out of one machine, put it into another, and use it. This definition implies a common disk format, which didn't exist before the '80s. It implies the same operating system and the same critical elements of hardware and ROM, not just a similar operating system or a cloned graphical user interface — although users can tolerate small differences, programs that are already written can't.

The Mac operating system is past its prime, it can't be improved significantly without a fresh start, and that means alienating all of us who have invested time and money in it.

It's amazing that IBM allowed clones to come into existence and compete with its products. But it did. Apple hasn't, but I'm not prepared to draw the conclusion that this has hurt Apple. So far.

So the current strategy is to write applications so they can run on various machines. Symantec's Bedrock supposedly will let developers do that, but it won't mean that all your Mac software will run on a Windows PC.

The Newton, though, will definitely be cloned, or at least there will be other machines based on the Newton architecture and operating system, with Apple's blessing (and license agreement).

So why does Jean-Louis Gassée think that the incompatibility of Newton's operating system is a good thing? Because the Mac operating system is past its prime, it can't be improved significantly without a fresh start, and that means alienating all of us who have invested time and money in it. The only way to beat the inertia of the installed base is to go to some new market; create something new there; and when you've sold a zillion of them, import the new product into the old market, now primed to accept what the new market has. Which is just what Gassée suspects Apple will do. So there are circumstances in which incompatibility can be desirable.

Good thing too.

By the way, don't bother to look for Laura, Bill, and Arrow Computer in any of the histories of this field. They may be there, but not under those names.

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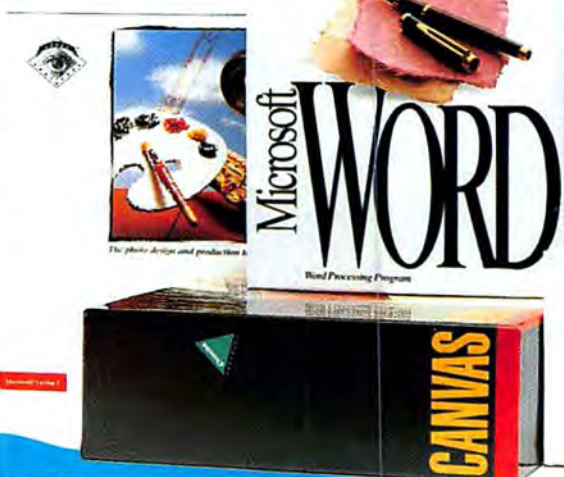

*For the PowerCache, a simple adapter is required for all non IIci installations. IIcx model requires a socket installation that is free from DayStar.

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NEW ON THE MENU

The wireless office: We don't know exactly what this means, but Motorola's Wireless Enterprise Systems group has announced a collaborative effort with Steelcase, a leading office-furniture manufacturer, to integrate wireless networking technology with office furniture. The companies say that this is intended to make network setup and employee relocation easier. I'll have my chair call your chair.

By Russell Ito

Deep words: Flat prose is the curse of every writer — and every presenter. There's nothing eye-grabbing about flat text on a slide, but stretch those flat letters into 3-D, and you've got another story. Until now, creating 3-D text has meant learning to use a 3-D program, but Pixar and Strata have just introduced 3-D-type packages for the masses. ✦ **Pixar's Typestry** ($295) lets you turn any Type 1 or TrueType font into 3-D. You just type a string, add bevels to the edges of the letters, extrude the text, position it however you like, and then apply lighting and surfaces. You can customize the bevels and the depth of the extrusion, and you can control as many as nine light sources in front of and behind your text, adding color and some lighting effects. Because the software's from Pixar, you can use the wide range of RenderMan shaders, from Pixar and from third-party vendors, for adding surfaces to the text and background. Typestry lets you animate your creations, so you can have moving 3-D logos, and you can save them as QuickTime movies. 510-236-4000. ✦ **Strata's StrataType 3d** ($295), a spline-based package, performs many of the same functions as Typestry. It creates 3-D type similarly and also works with Type 1 and TrueType fonts. In addition, StrataType 3d offers several text effects, such as running text along a path, that Typestry doesn't. StrataType 3d can import Illustrator files and can export PICT, TIFF, and EPS files. Unlike Typestry, however, StrataType is designed for still images only. It doesn't support animation, and you can have only a single light source. 801-628-5218. ✦ Because everyone likes the look of 3-D but it's hard to produce, straightforward 3-D-type packages are a natural. Don't be surprised if every major 3-D-graphics developer has a 3-D-type package in the next several months.

Up to Date . . .

Interactive Physics II is the newest incarnation of Knowledge Revolution's Newtonian-physics lab in a box. IP II offers full, interactive control over experiments plus a complete authoring and scripting environment and full System 7 support. 800-766-6615 or 415-553-8153. $399. ✦ **Connections 2.1,** Danny Goodman's HyperCard PIM, from Concentrix Technology, now boasts five times the speed of its predecessor. It also has integrated fax messaging. 415-358-8600. $199.

Premiere 2.0: The Upgrade

At a time when Hollywood seems to be cranking out sequels faster than originals, Adobe may have set a record, producing a major upgrade to Adobe Premiere less than ten months after shipping the original. Premiere 2.0 adds a huge number of features that make it far more than just a QuickTime editor.

Premiere 2.0 includes PostScript rasterizing technology, so you can import Illustrator files and create smooth-edged animated titles. And because it includes several keying options (such as chroma, luminance, and alpha-channel), you can superimpose titles on other clips or make a clip show through the letters in a title.

Unlike the original, Premiere 2.0 reaches beyond QuickTime. It now supports SMPTE time code and produces EDLs (edit-decision lists) for auto-assembly and device control. Premiere 2.0 has a plug-in architecture similar to Photoshop's, which supports the creation of EDLs. One of the first third-party plug-ins to be included in the package will be from Digital F/X. Video F/X TapeMaker will automatically convert a Premiere movie into a Video F/X EDL for assembling on tape with a Digital F/X system.

Premiere 2.0 can produce many more visual effects, including animated clips that move, spin, zoom, twist, and so on. It can also import and export movies to and from Photoshop, so you can take a clip into Photoshop, add additional graphic layers such as color tracings of the image, and then export the clip back to Premiere 2.0.

Improved editing features include the ability to preview a sequence simply by dragging the cursor through the time window instead of having to use the Preview Bar and the ability to compress or expand a clip automatically to fit a specific time interval.

Getting started in Premiere 2.0 is also easier, because now you can capture movies from within the program itself, which the first version of Premiere didn't let you do. And once Apple releases QuickTime 1.1 and Sound Manager 2.1, Premiere 2.0 will also be able to handle audio-CD-quality (16-bit, 44.1-kilohertz) sound.

Premiere will continue to be bundled with SuperMac Technology's Video-Spigot video-digitizing card. Although Adobe didn't make any specific announcement about which version of Premiere would be shipping with the bundle, its spokespeople indicated that a subset of Premiere 2.0 would eventually replace the currently shipping version, 1.0.

Adobe Systems, Inc., 1585 Charleston Road, P.O. Box 7900, Mountain View, CA 94039; 415-961-4400. $695.

Adobe Premiere 2.0 offers professional video-editing features for the desktop. It supports SMPTE time code and PostScript rasterizing for smooth animated titles. You can even add Photoshop effects, as shown here.

A Tabloid-Page Printer from QMS

It's taken a while for the printer world to make a move up from 300 dpi, but we seem to be on the way now. QMS' newest printer extends two aspects of the standard desktop network printer: resolution and paper size. The QMS 860 Hammerhead Print System is a true 600-x-600-dpi printer that can print on paper as large as 11 x 17 inches (tabloid-sized).

The QMS 860 Hammerhead Print System brings true 600-dpi resolution and PostScript Level 2 compatibility for just $4,495.

The QMS 860 uses a 25-megahertz Intel 80960CA RISC chip to control its Canon LBP-BX print engine. The engine is rated at 8 ppm (pages per minute) for letter-sized prints and 4 ppm for tabloid-sized jobs. The QMS 860 is the first printer to use the LBP-BX engine. Like other QMS printers, the 860 includes several PDLs (page-description languages), including QMS' emulations for PostScript Level 1 and Level 2 and HP PCL 4. The 860 is the first printer to include a PostScript Level 2-compatible emulation. The unit comes with 8 megabytes of RAM, which is enough to print a letter-sized page at 600 dpi. To get the same resolution on a tabloid-sized page, however, you must add an additional 4 megabytes ($459). The printer can hold a maximum of 32 megabytes.

Like the QMS-PS 1700 and the QMS-PS 2000 printers, the 860 uses QMS' Crown multitasking operating system to handle such tasks as multiple-language and -protocol support; emulation switching; simultaneous interface operation (SIO); and context switching, in which the printer retains the current state of an emulation when it switches to another language and emulation.

The 860 ships with serial, parallel, and LocalTalk interfaces. An Ethernet option is available.

QMS, Inc., One Magnum Pass, P.O. Box 81250, Mobile, AL 36689; 800-523-2596 or 205-639-4400. $4,495.

Video-Card Free-Fall

Although CPU prices are dropping fast, video-card prices are falling faster.

Radius offers both 8- and 24-bit video cards. The PrecisionColor 8Xj is an 8-bit accelerated-video NuBus card priced at $599. It can drive monitors with a resolution as high as 1,152 x 882 pixels (the maximum for a 21-inch monitor), and when it's paired with Radius' PrecisionColor Display/20, it can do on-the-fly resolution switching for resolutions from 640 x 480 pixels to 1,152 x 882 pixels. For 24-bit color, Radius' latest low-cost video card is the PrecisionColor 24Xk, a 24-bit accelerated-video NuBus card that costs $999. It can drive monitors with resolutions as high as 1,024 x 768 pixels (the maximum for a 19-inch monitor), and when used with a Radius PrecisionColor display, it can also do on-the-fly resolution switching.

E-Machines has introduced its own budget 24-bit accelerated-video card: Priced at $1,299, the Futura LX can drive monitors with resolutions as high as 1,152 x 870 pixels at a 24-bit pixel depth. When paired with a multiple-resolution monitor, it can do on-the-fly resolution switching from two resolutions: from 832 x 624 pixels to 1,024 x 768 pixels or from 1,024 x 768 pixels to 1,152 x 870 pixels.

Radius, Inc., 1710 Fortune Drive, San Jose, CA 95131; 408-434-1010. PrecisionColor 8Xj, $599; PrecisionColor 24Xk, $999.

E-Machines, Inc., 9305 S.W. Gemini Drive, Beaverton, OR 97005; 503-646-0946. $1,299.

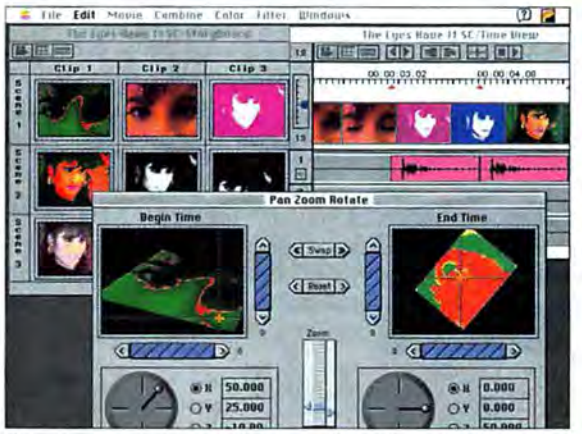
VideoFusion: Atomic Video Effects

Adobe Premiere and DiVA VideoShop may have been the first QuickTime-editing packages to hit the streets, but a newcomer may take the prize for the snazziest effects. VideoFusion can produce some eye-popping special effects.

VideoFusion gives you all the visual-editing capabilities you'd expect plus support for Photoshop plug-ins, and it also offers an amazing array of visual effects. You can create pan, zoom, and rotate effects from a single dialog box, so your clips can spin, twist, and fly onto or off the screen. You can create traveling mattes, so you can play one clip in a field that moves over another clip. Movies can be combined by superimposing or differencing between clips, and even logical operations are supported.

In the area of color processing, you can cycle colors through a clip, tint movies, and even automatically overlay color edges on objects for an automatically generated hand-tinted look.

VideoFusion brings the notion of tweening to effects. It lets you specify how the clip should look in the first frame of the effect, how it should look at the end of the effect, and how long the effect should take. This gives you a great deal of control in creating dynamic effects.



VideoFusion packs some eye-popping video effects. From flying movies to hand-tinted looks to traveling mattes, it's a digital-video-effects suite on a disk.

Even if you already own one of the other QuickTime editors, VideoFusion is worth a look.

VideoLake Ltd., 1722 Indian Wood Circle, Suite H, Maumee, OH 43537; 800-638-5235 or 419-891-1090. $649.

NewsLine

Reports and Analysis

New Apple/Toshiba PDA

LOS ANGELES, CA — Even before the first PDA could roll off the line, Apple announced a new partnership with Toshiba to produce a second PDA. The new model, code-named Sweet Pea, is expected to be a multimedia player capable of playing back material from a CD-ROM. It will be the first commercial product to incorporate technology from Kaleida, the Apple/IBM multimedia joint venture. After Apple and Toshiba have developed the unit together, Toshiba will manufacture both the Apple- and the Toshiba-branded models. The new PDA is expected to ship in mid-1993.

Other PDAs Coming

SAN FRANCISCO, CA — Whether Apple has actually discovered a real consumer need or has simply panicked its competitors into a stampede, more PDAs are likely to appear soon from companies not associated with Apple. Intel has announced an agreement with VLSI Research that will have VLSI manufacturing Intel-based chips for future handheld computers. The agreement licenses the core circuitry of Intel's 386SL chip to VLSI, which will combine that technology with additional circuitry to produce a CPU for a palmtop device. VLSI will sell the new chip to hardware manufacturers. At the same time, Intel will invest $50 million in VLSI.

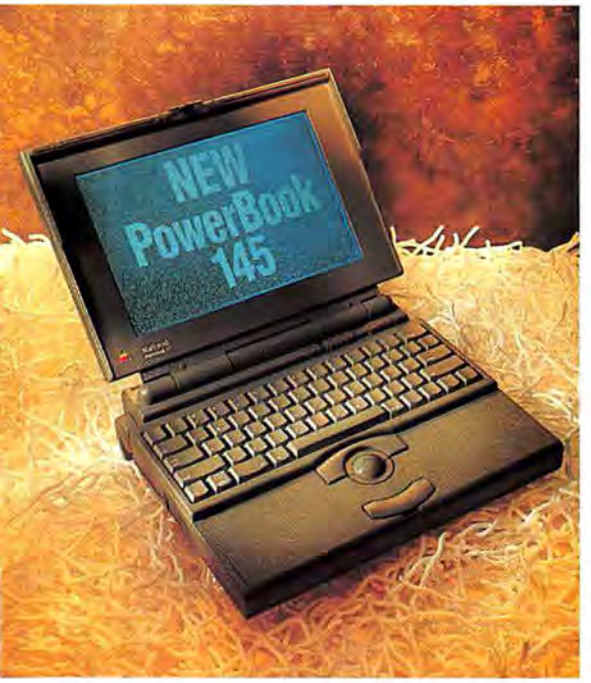
Shortly after the Intel/VLSI announcement, GO and AT&T announced that they would team up on a "personal communicator" project. GO will modify its PenPoint operating system to work with a new AT&T chip called the Hobbit, which is said to combine computing functions with communications capabilities. Eo Computer, a GO hardware spin-off, announced that it was working on a personal communicator that will use the Hobbit and the PenPoint operating system. Eo says that the device, expected to ship in December or January and to cost between $1,500 and $2,000, will ship "before Apple ships Newton."

Claris Sends XTND to Apple

SANTA CLARA, CA — After developing the XTND file-translation architecture while still independent, Claris has now transferred it to Apple. XTND support and distribution of the XTND developers' tool kit will be handled through APDA. Claris will retain ownership of the translators it developed.

Fast Starter:

The PowerBook 145



Sometimes trickle-down works. Although Apple continues to push the upper limits of the desktop with machines such as the Quadra 950, it's also adopted a policy of driving more and more performance into its midrange and low-end Macs without raising their prices. As a result, we've recently benefited from the LC II and now the PowerBook 145, the new base-model PowerBook.

Until now, PowerBook buyers deciding between the midrange 140 and the top-of-the-line 170 had to weigh the 170's higher speed, better display, and higher price against the 140's affordability. But speed and affordability aren't issues anymore. The PowerBook 145 uses the same 25-megahertz 68030 microprocessor found in the 170, making it a match for the 170. Not only that, but the 145 costs $800 less than the original 140, even though it has a faster processor and 2 more megabytes of RAM. The 145 comes in two configurations: a 4/40 ($2,399) and a 4/80 ($2,799).

From the outside, the 145 looks identical to the 140 — except for the label change. Internally, however, Apple has made a simple change. Because of the PowerBooks' unique motherboard/daughterboard design, in which the CPU and memory are on the daughterboard and the motherboard is reserved for I/O functions, Apple was able to make a simple chip swap without having to modify the motherboard.

Although the 145 is essentially a PowerBook 170 at heart, there is one minor difference: the FPU. Unlike the 170, the 145 doesn't have a floating-point chip. Not only does it not have one on its daughterboard but it also doesn't even have an open socket for adding one. However, because most programs don't use the FPU, this is only a minor omission.

The PowerBook 145's overall speed demonstrates just how insignificant the lack of an FPU is. In our tests, the 145 was consistently 25 to 40 percent faster than the 140, roughly matching the 170 in every test. Whether it was in the Excel find, the Excel recalculation, or the Excel sort, the 145's speed was either identical to the 170's or within such a small margin of it that the difference was attributable to the tester's reflexes in stopping the stopwatch. Even in the Word scroll, the one test that might have showed off the 170's faster display, the 145 and the 170 finished in a dead heat. Our tests confirmed Apple's assertion that the 145 is a PowerBook 170 with a 140-style LCD screen.

The introduction of the PowerBook 145 marks the first significant change in the PowerBook line since Apple introduced its notebook computers barely ten months ago. The 145 should be available by the time you read this, and when it starts shipping, the PowerBook 140 will cease to exist. At the same time, if not well before, the PowerBook 100 will begin to disappear.

The elimination of the 100, however, does simplify the PowerBook line. The PowerBook 145 is now the "bottom" of the line, and the 170 retains its position at the top. But because their speed is virtually identical, all you really have to choose between is the displays.

The only bad news in the 145 story is for current PowerBook 140 owners. Unfortunately, Apple isn't offering an upgrade path of any kind. No daughterboard swap, no chip swap, no nothing. And it's unlikely that any third-party manufacturer will offer a solution either. The only ray of hope Apple has offered is its assurance that any 140 that comes in for servicing will be repaired as a 145. So if the CPU daughterboard in your 140 fails, the resulting repair will give you a PowerBook 145.

The PowerBook 145 is an outstanding value that basically simplifies the question "Which PowerBook should I buy?" to "Do you need the fast, active-matrix display enough that you're willing to pay a premium for it?" If the answer to the latter question is no, you've got your answer: Go with the 145. Other than the display, the 170 has no significant advantages, because its only other advantage is the FPU, which most programs don't use anyway. For virtually the same price as the PowerBook 100's original cost, the PowerBook 145 is a notebook computer that can match a Mac IIci. Sometimes the trickle-down effect isn't too bad.

Figure 1: Who's on Top?

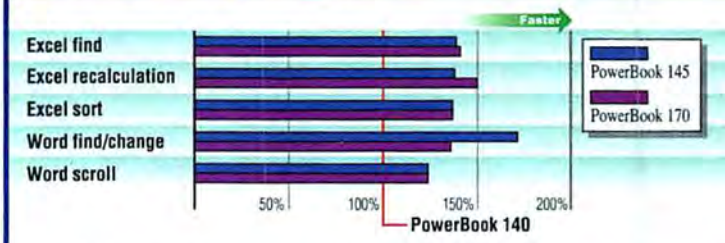


Figure 1: Apple's new PowerBook 145 is really a 170 with an LCD screen. The new machine roughly matched the top-of-the-line PowerBook 170 in every test. All tests were performed on 4-megabyte units with 40-megabyte hard drives.

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INTEGRATED SOFTWARE

BeagleWorks

BeagleWorks' word processor is top-notch, but the package's module integrator is a mixed blessing.

After a false start in February, BeagleWorks is officially out of the gate to compete in the heated integrated-software arena. The combination word-processing, spreadsheet, database, communications, and drawing/painting package distinguishes itself from its rivals by using a unique, customized implementation of publish-and-subscribe to integrate its modules.

The Good News

For some tasks, BeagleWorks' use of publish-and-subscribe outshines the integration method used by its rivals, ClarisWorks and GreatWorks. For starters, BeagleWorks uses an enhanced implementation of publish-and-subscribe that makes the process easier to learn and use. You can publish an edition and subscribe to it, for example, without encountering any intervening dialog boxes — a method that works almost as transparently as cut-and-paste.

Although GreatWorks offers a similar customized version of publish-and-subscribe, BeagleWorks goes several steps beyond GreatWorks by providing in-context editing and an all-purpose frame tool.

With in-context editing, you can directly modify the data inside a subscribing frame without returning to the original publishing document. In addition, with the frame tool, you can create subscribing frames and position them within documents simply by clicking and dragging. This technique, which works in a similar fashion to ClarisWorks' use of frame tools, lets you bypass the standard publish-and-subscribe procedure.

BeagleWorks' approach has one significant advantage over ClarisWorks frames. Because ClarisWorks frames don't use publish-and-subscribe, they must all exist within the same document to work together. BeagleWorks frames, on the other hand, can access data from separate documents.

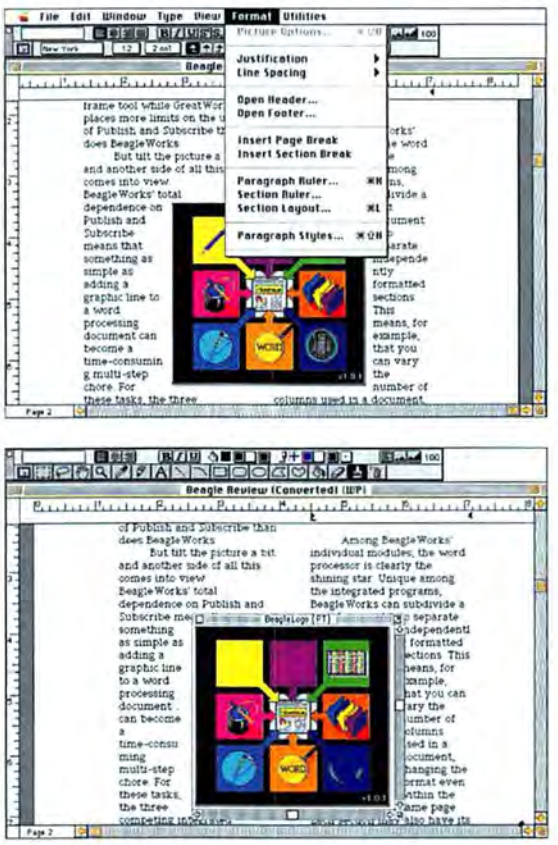
BeagleWorks' publish-and-subscribe is active in every module except for the communications one (although the word processor is limited to subscribe only), and you don't have to be running under System 7 to use it — the BeagleWorks implementation works with System 6.

That's the good news. The bad news is that BeagleWorks' total reliance on publish-and-subscribe as an integration vehicle can turn simple tasks such as adding an editable graphic to a word-processing document into time-consuming multistep chores. By contrast, ClarisWorks and GreatWorks make a common tool palette of drawing and text tools available across modules, so you can create text boxes and graphics almost effortlessly and edit them within any document type.

BeagleWorks also uses a tool bar, but its options shift as you change modules and you can use only options relevant to the module you're working with. Another drawback is the unwieldy collection of edition files and publisher documents that builds up on your drive.

Taken individually, the BeagleWorks modules vary widely in quality. The word processor is clearly the shining star. It's the only one of the integrated packages that can subdivide a text document into separate, independently formatted sections (even on the same page). BeagleWorks is also the only program in the group that can run text around the borders of frames and pictures, even following irregular contours. Furthermore, you can separately define character and paragraph styles.

The program's spreadsheet module is also impressive, featuring an auto-sum tool; variable row, height, and column widths; and options for adding borders, shading, and text notes to cells. However, it suffers from one glaring weakness — its charting functions. Charts aren't automatically updated when data



The word-processing module is BeagleWorks' strongest feature. It's the only integrated-software module that lets you divide text documents into separately formatted sections as well as set text to run around graphics. The logo in this document was pasted from the Clipboard (top). If you use BeagleWorks' unique version of publish-and-subscribe to place graphics (bottom), you can edit them without returning to the publishing document.

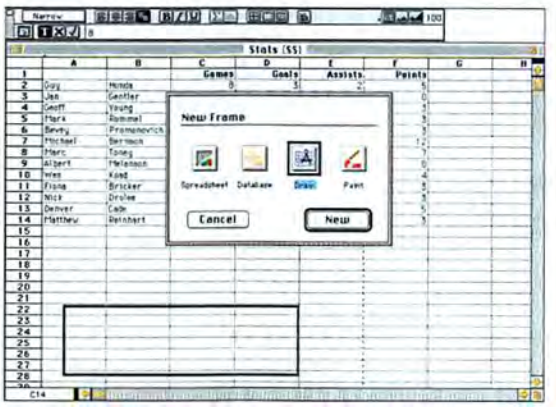
changes in the worksheet. Moreover, charts exist as separate documents in the drawing module. As a result, when you manually update charts, enhancements you've made in the drawing module are deleted as the program redraws the new chart.

BeagleWorks' database module is decidedly lackluster. It doesn't provide separate modes for layout design and data entry, making it easy for you to unintentionally alter layouts while entering data. In addition, field alignment is completely inflexible, and with the exception of the memo field, data fields can't contain more than one line of data. Similarly, field titles can't be moved separately from the data-entry field, making the process of designing mailing labels incredibly tedious.

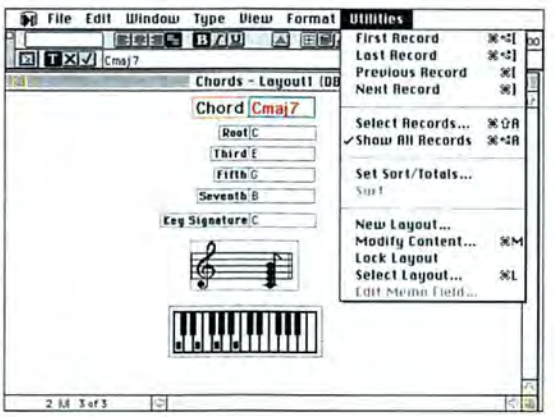
The program's 8-bit-color drawing and painting modules are adequate, but they won't win any points for polish or depth of features. The painting module is plagued by slow and jerky response, making it difficult to use the paintbrush effectively. Another disappointment is the drawing module's inability to format individual characters separately within a text box — you can't boldface individual words, for example. GreatWorks (the only other integrated package that has a painting module) especially outdistances BeagleWorks in this area by featuring designed-oriented tools such as a magic wand, Bézier curves, and gradient fills.

The BeagleWorks communications module uses Apple's Communications Toolbox. The module's most distinguishing feature is its scripting option for automating log-ons. ClarisWorks macros can also automate log-ons, but you can't view or edit them once you've created them, as you can with BeagleWorks scripts. BeagleWorks also includes a spelling checker and a thesaurus, but we were disappointed to discover that the spelling checker is active only in the word-processing module.

The first iteration of BeagleWorks was withdrawn from the market because of numerous bugs. The new version is more stable, but it's not completely bug-free. When we tried to capture text in the communications module, the resulting file consisted of unintelligible gibberish. We also encountered minor problems with margin settings and column formatting in the word processor and ran into occasional trouble in the database module. You'll need considerably more than the 900K of memory suggested — even with 1,400K of RAM and only two open documents, we found that BeagleWorks occasionally quit unexpectedly because of insufficient memory.



BeagleWorks lets you bypass the standard publish-and-subscribe process and create subscribing frames (lower left) simply by clicking and dragging. The dialog box lets you select a frame type.



BeagleWorks' lackluster database module provides a picture field, but field size is limited to a single line and field names are locked to the data-entry area.

The Bottom Line

BeagleWorks' reliance on publish-and-subscribe as an integration vehicle has its advantages and disadvantages. To its credit, the program's publish-and-subscribe is more comprehensive, more flexible, and easier to use than any other program's implementation to date. For numerous tasks, however, publish-and-subscribe — no matter how well implemented — can make sharing data among modules slower and more awkward than it is with alternative methods.

Moreover, looking beyond the integration method, the quality of the BeagleWorks modules is inconsistent. Although the package sports the best word processor of any integrated package currently available, the database module comes in dead last when compared with the competition. When all is said and done, if you're looking for an integrated package with the most fully featured collection of modules overall, we recommend GreatWorks. If your first priority is a package that combines the slickest level of integration with a consistent interface across modules, ClarisWorks is your best buy. If you require a versatile word processor and a spreadsheet program but don't need a strong database module, we can recommend BeagleWorks, but be forewarned — publish-and-subscribe has its limitations as a module integrator.

— Ted Landau

Get Info

BeagleWorks

$\$\$\$^{1/2}$

Published by: Beagle Bros., Inc., 6215 Ferris Square, Suite 100, San Diego, CA 92121; (619) 452-5500.
Version: 1.0.1.
List Price: $299.95.

CAD

AutoCAD Release 11 for Macintosh

Autodesk meets Mac users halfway with a revamped interface for AutoCAD.

Touting the latest release of its ubiquitous CAD package as "very Mac-like," Autodesk has made a stronger effort to address the needs of Mac CAD users than it did with the previous version, which was essentially the DOS version of AutoCAD running in a Mac window. AutoCAD Release 11 for Macintosh features new tool bars, conventional dialog boxes, and floating menus, but the program's interface needs further refinement before it can rack up winning points with Mac users. Interface aside, Release 11 sports several powerful new features that make it an ideal tool for 3-D engineering applications.

Straddling the Fence

In addition to an extensive set of drawing and design primitives, the basic AutoCAD package provides 2-D and 3-D wire-frame objects, dimensioning, crosshatching, and a basic set of 3-D surface-modeling primitives. With Release 11, you can create and manipulate objects with more-conventional Mac tools, but the program still doesn't work like a true Mac application. Straddling the fence between a DOS and a Mac interface, AutoCAD presents users with a confusing array of command-input options — you can use the program's new tool palettes, the traditional AutoCAD menu commands to the right of the screen, the Mac menu bar, the AutoCAD command window at the bottom of the screen, and an optional digitizing tablet. Mastering this daunting variety of methods takes some time, but once users get the hang of it, most will probably use several, if not all, of the methods by the end of a typical AutoCAD session.

One substantial and welcome change in Release 11 is the addition of the Autoselect and Autoedit commands. When Autoselect is activated, you can select an object by clicking on it and then apply an action to it — standard fare for Mac users, but previous versions of AutoCAD have required you to select commands first and then specify objects. Autoedit provides selected objects with MacDraw-like handles you can use for moving or editing objects. This command takes the selection capability one step further than do other Mac programs, however, by allowing the discontinuous selection of handles — a feature that comes in handy for repositioning selected vertices. One aspect of this feature that may not be immediately obvious is the ability to select multiple objects by holding down the Command key and dragging a selection rectangle with the mouse.

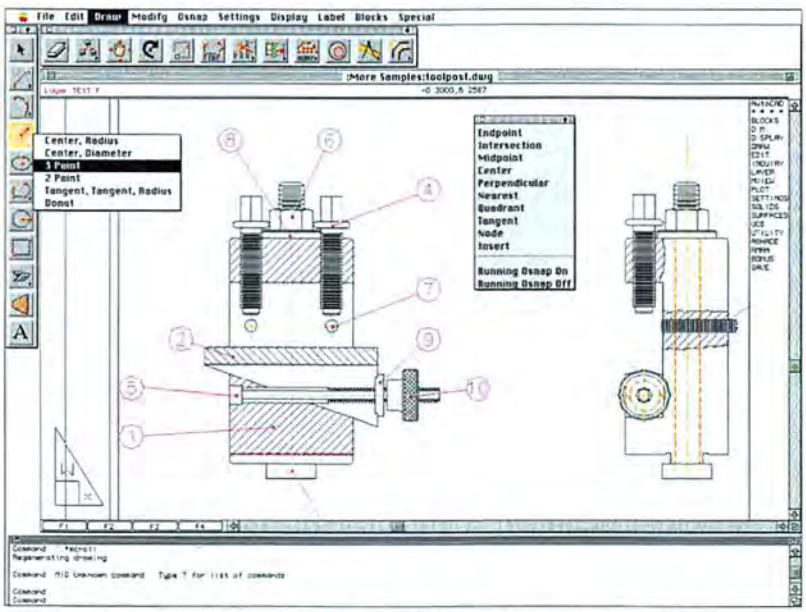
Also new with Release 11 is Clipboard support for cutting and pasting DXB (a binary form of DXF) and PICT data. The DXB format is a good choice for exchanging 3-D data between AutoCAD and other programs, because it carries more-precise information than the PICT format does. Autodesk has some wrinkles to iron out with this format, however — we encountered frequent error messages in our tests involving DXB file transfers.

Publish-and-subscribe is relatively new to the Mac, but AutoCAD users have been taking advantage of a related feature, called blocks, for some time. Blocks are grouped AutoCAD symbols that can serve as library items. An AutoCAD block that has been inserted into a document is also updated when you edit the original.

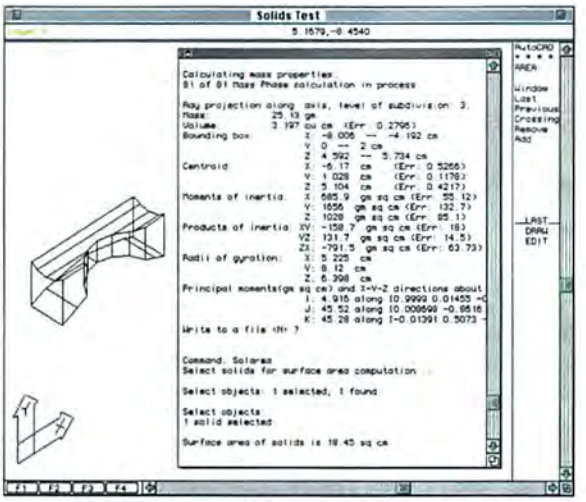
Another new feature, similar to blocks, is External Reference Files. This feature is a boon for workgroups involved in large, complex projects, because it lets users attach drawing files stored locally or remotely on networks to an active drawing. Because reference files do not become part of the drawing file to which they're attached, file sizes are kept to a minimum. Users can move, scale, and copy the attached drawings as well as make changes in colors and line styles, and the original reference files remain unaltered. When reference files are modified, the changes are reflected in all drawings to which they're attached.

Solid Modeling

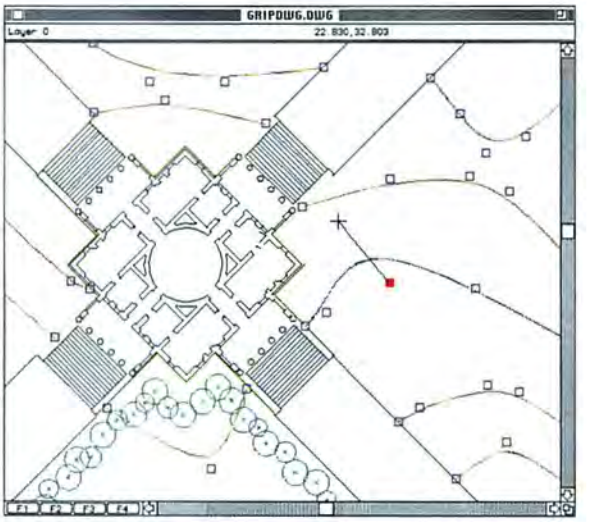
Release 11 makes AutoCAD's solid modeler, the Advanced Modeling Extension (AME), available to Mac users. Unlike wire-frame or surface modelers,



Although the latest Mac version of AutoCAD sports tool palettes with pop-up menus as well as Mac-style dialog boxes and floating menus, new users may find command input confusing. The program also retains the traditional AutoCAD command menu (right) and the command window at the bottom of the screen.



AutoCAD Release 11 provides an optional solid-modeling tool. The sophisticated AME package handles volume, weight, surface area, and other mass-property computations, making it ideal for 3-D mechanical engineering.



Release 11's Autoedit command allows you to use MacDraw-like handles, called grips, to move or stretch selected objects.

this $495 option uses 3-D primitives such as boxes, cones, cylinders, and extruded or revolved profiles. Users can create complex objects by using Boolean commands (intersect, subtract, and union) to join primitives. To create a hole in a plate, for example, you can simply subtract a cylinder primitive from a box primitive. Unlike most 3-D wire-frame and surface modelers for the Mac, AME can easily compute volume, weight, surface area, and other mass properties to a precise degree, making it an ideal tool for mechanical engineers. AME requires AutoCAD running under System 7.

Programmability and customization are AutoCAD hallmarks. At the simplest level, you can use a text editor or a word processor to create script files that execute a series of commands. As a multiplatform CAD product, AutoCAD lets scripts be shared among Macs, PCs, and UNIX machines.

An even more powerful customization tool is AutoLISP, AutoCAD's implementation of the LISP programming language. For those who have programming skills, AutoLISP is relatively easy to learn. Also, ready-made programs are available from the AutoCAD development community. Like script files, AutoLISP programs are platform-independent. For serious developers, Autodesk offers the AutoCAD Development System, which provides a high-level-programming interface to Apple's MPW C and Symantec's THINK C compilers.

Although Release 11 makes significant strides toward addressing AutoCAD's usability for Mac users, it still lags behind the capabilities of the current DOS and UNIX versions in several key areas. Unlike Release 12 for DOS and Release 12 for UNIX, for example, Release 11 doesn't support PostScript fonts or bit-mapped entities such as fill patterns. Another problem for Mac users is that third-party AutoCAD solutions for the Macintosh have been slow to appear.

AutoCAD Release 11 is a mammoth application that's distributed on twelve 800K disks. It requires a member of the Mac II or Quadra family, a floating-point coprocessor, and at least a 13-inch monitor. Given AutoCAD's reliance on floating-point mathematics, we highly recommend a 68040-based machine. Compared with a Mac II, the Quadra 950, for example, offers nearly ten times the speed for math-intensive functions.

A complete AutoCAD installation requires at least 20 megabytes of disk space — 6 megabytes for the basic AutoCAD 2-D/3-D modeler; 9 megabytes for AME; and space for the package's numerous sample drawings, programming extensions, and other requisite files. RAM requirements are also demanding — a minimum of 8 megabytes for AutoCAD and 16 megabytes for the AutoCAD/AME combination. Additional items well worth considering are a digitizing tablet (the new version supports ADB tablets in addition to serial devices) and a display-list processor, such as the Radius QuickCAD or Rocket, for accelerating screen redraws.

The Bottom Line

At $3,500, AutoCAD Release 11 is a pricey CAD package. Compared with its competitors for the Mac, Release 11 may not provide the best interface but it does offer the most power and customizability — it can tackle just about any design or drafting task you can devise. Moreover, Release 11's interface enhancements seem a good indication of the direction Autodesk is going with its Mac package. In the race to achieve the best of both worlds — powerful features and an intuitive interface — in the long run, we're putting our money on AutoCAD. It seems likely that Autodesk will transform AutoCAD into a consistent Mac application well before competing packages can add the level of power and sophistication already provided by AutoCAD's tools.

— James K. Anders

Get Info

AutoCAD Release 11 for Macintosh

★★★½

Published by: Autodesk, Inc., 2320 Marinship Way, Sausalito, CA 94965; 415-332-2344.
List Price: $3,500; AME, $495.

FONTS & TYPOGRAPHY

Fontographer

Altsys' enhanced font-design program becomes the new tool of choice for novices and professionals.

Fontographer 3.5, the latest version of Altsys' font-design package, successfully addresses many of the challenges presented by rival FontStudio 2.0, from Letraset. Although FontStudio maintains the edge in character metrics, the new version of Fontographer surpasses FontStudio in several key areas. In addition to superior interpolation and hint editing, Fontographer sports new features that Letraset's program lacks altogether, including support for Adobe's Multiple Master font format and two new pressure-sensitive drawing modes.

Fontographer's freehand drawing tool features two new pressure-sensitive options that shine when used in conjunction with pressure-sensitive-pen systems such as those from Wacom or CalComp. With a standard pressure-sensitive pen, applying light pressure on the stylus draws a fine line; increased pressure makes a wider line. As you draw, the shape is displayed in solid black. When you're finished, Fontographer converts the object to a solid PostScript shape, with all the usual editable points.

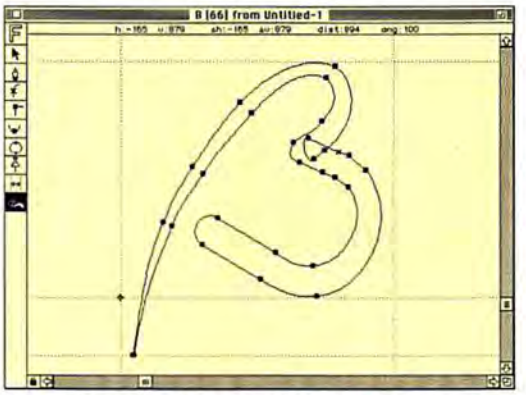
A pressure-sensitive calligraphy pen works in a similar fashion but gives you the added ability to set the width and angle of the electronic nib as well as the minimum and maximum widths. This enables you to draw calligraphic characters with a single stroke of the pen, rather than by painstakingly placing each anchor and control point in a character.

If you don't have a pressure-sensitive stylus, you can use the left- and right-arrow keys to simulate variations in pressure but you lose some of the control and most of the spontaneity the stylus offers.

In its most recent release of FontStudio, Letraset added the ability to create a new font weight by interpolating, or blending, two existing font weights. However, FontStudio's interpolation method suffers from several severe constraints. To interpolate between two instances of the same character, each in a different weight, for example, both characters must have the same number of control points and the points must be the same type (corner, curve, or tangent) and must be drawn in the same order.

The new version of Fontographer offers a workaround to this problem: It inserts additional points as required in the fonts you're interpolating. Although the results can be unpredictable (don't expect to get a good-looking font weight by interpolating Times and Helvetica, for example), a savvy user can get good results with Fontographer's approach.

The program's Change Weight command offers a simpler and more predictable way of generating font weights than interpolation does. By entering a positive or negative number of em units, you can make fonts lighter or heavier. The results are more predictable than those you obtain when you use interpolation. When you change weight, you can choose to maintain the vertical size, the horizontal size, or neither. Applying separate weight changes while you are using various options can alter the vertical and horizontal elements of the font independently.



The new version of Fontographer takes the lead in many areas of type design. Particularly impressive is the ability to create script characters with a single stroke of a pressure-sensitive pen.

Both interpolation and the Change Weight command can result in characters that contain overlapping paths, a condition that isn't allowed in the Type 1 format. As a result, Altsys has extended Fontographer's Remove Overlap command to apply to an entire font rather than only to a single character, which it did in earlier versions.

Other new convenience features in Fontographer include a movable Location dialog box (the box lets you specify the position of anchor and control points numerically) and additional keyboard commands for managing anchor points. A new Autosnap feature in the drawing window makes it easier than it was in previous versions to align two points either vertically or horizontally.

Manual hint editing and Multiple Master font generation make Fontographer a near-state-of-the-art program, but they're strictly for professional use. One caveat: If you plan to produce Multiple Master fonts, you'll need Adobe's Multiple Master INIT, the Font Creator application, and Adobe Type Manager 3.0, all of which are currently available only with the purchase of an Adobe Multiple Master font.

The Bottom Line

Fontographer's new features bring it ever closer to the power of high-end font-creation systems such as the $35,000 URW system. For a much lower cost, Fontographer provides enough power to satisfy many of the demands of professional type designers. At the same time, its interface, which is simpler and less cluttered than rival FontStudio's, makes the program accessible to novice users. Last but not least, Altsys maintains an excellent track record for frequent, and often free, upgrades. Overall, we give Fontographer the nod as the tool of choice for creating fonts on the Macintosh.

— Bruce Fraser

Get Info

Fontographer
★★★★½
Published by: Altsys Corp., 269 W. Renner Road, Richardson, TX 75080; 214-680-2060.
Version: 3.5.
List Price: $495.

MicroPhone II

MicroPhone II 4.0 sports full System 7 support, new terminal-emulation protocols, and a forward-looking interface to on-line services.

With the long-awaited release of version 4.0 of its venerable telecommunications program, Software Ventures has brought MicroPhone II up to speed in several key areas. At the top of the new-features list are full System 7 support, expanded terminal-emulation capabilities, and a new graphical front end to remote computer services.

System 7 Support

MicroPhone II's newly enhanced support for System 7 improves the program's ability to interact with other applications through Apple events. The program handles incoming events only — the software can't yet generate events. The new version can also publish editions (not subscribe). It works with Communications Toolbox-compatible device drivers and supports Balloon Help.

MicroPhone II's terminal-emulation capabilities have finally been brought up-to-date with the addition of VT220 and VT330 support (previous versions supported only the aging DEC VT100 terminal emulation) as well as support for IBM PC ANSI. The promised Telnet-terminal support for network UNIX users was not included in version 4.0, but according to Software Ventures, this feature should be available by the time you read this review.

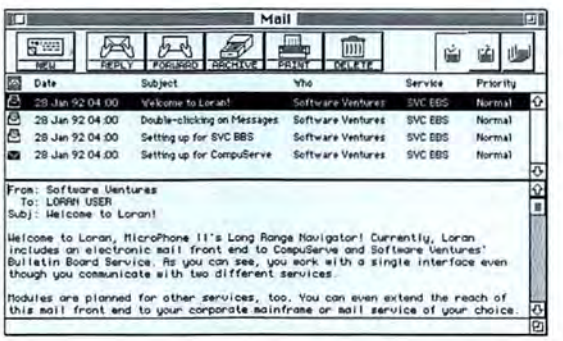
MicroPhone II's System 7 support and new terminal-emulation capabilities are enhancements users can take advantage of immediately, but one of the most tantalizing new features holds more promise for the future than for the present. Long Range Navigator, or Loran, eventually will let users connect automatically to a variety of remote computer services. By providing a common user interface for all services, Loran will greatly simplify the connection process. In its current iteration, Loran supports only CompuServe and Software Ventures' own bulletin-board system. But in the near future, Software Ventures plans to add front ends that will give users direct access to MCI and to services that offer stock quotes, shopping information, and news.

Additional, but more subtle, interface enhancements make this version of MicroPhone II more flexible than its predecessors. For example, this version offers movable dialog boxes, the ability to switch to background applications while dialog boxes are open, keyboard command equivalents for invoking dialog boxes, and a pop-up menu for selecting transfer protocols within the Send and Receive dialog boxes.

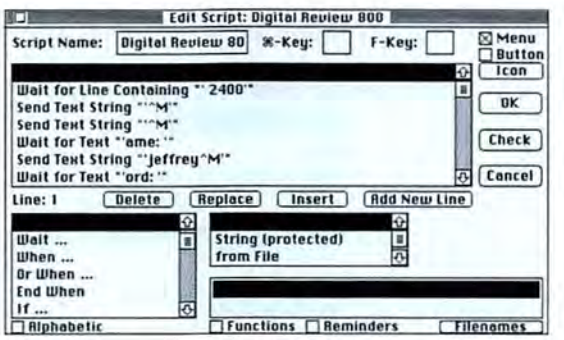
MicroPhone II's robust scripting facilities for creating custom environments also are enhanced in version 4.0 to let you use as many as 200 variables. In addition, the MicroEditor, a separate DA for script editing, has been incorporated into the main application. Also new is support for HyperCard 2.0 XCMDs and XFCNs, and still pending is the promised MPDialogerPro HyperCard stack for creating dialog boxes for use with MicroPhone II scripts. According to Software Ventures, registered users can request the stack once it's been completed, which should be sometime this fall.

As with previous versions of MicroPhone II, you can create scripts in several ways. The simplest method is to select a single script command from a dialog box, supply its parameters, and insert the line into a script. The updated script is then displayed in the dialog box. Although this method is useful for newcomers to MicroPhone II, because it shields them from the program's daunting scripting language, it's not the best choice if you plan to do extensive script editing. You can additionally create scripts by entering commands directly into a text file, using a text editor such as MicroEditor. Although this is a less structured approach, it lends itself to easier editing.

Novices will appreciate MicroPhone II's Watch Me facility, a feature that creates scripts simply by capturing all the actions performed to accomplish a particular task, such as logging on to a



MicroPhone II's forward-looking Loran interface promises easy access to a variety of on-line services.



MicroPhone II's hallmark scripting facilities have been enhanced in the new version.

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remote computer system for the first time. Invoking a script is as simple as selecting its name from the Phone menu, and you can assign a variety of color icons to scripts and put them on a movable palette. Network administrators can employ version 4.0's password protection to prevent users from modifying scripts.

If you work in a mixed Mac/Windows environment, MicroPhone II is a particularly good choice, because you can port MicroPhone II scripts to the Windows version of the program (the NeXT platform is also supported).

MicroPhone II has always provided popular file-transfer protocols, including Xmodem, Ymodem, Ymodem-G, Zmodem, Kermit, and CompuServe's Quick B. In version 4.0, Kermit support is enhanced to allow packet sizes as large as 4K.

MicroPhone II's documentation, now contained in two volumes rather than three, is excellent, but we wish more scripting examples were provided. Technical support is helpful and responsive. Included in the program's base price of $295 is introductory time on America Online and CompuServe.

The Bottom Line

Granted, these enhancements to the Mac's most powerful communications program are far from earthshaking, but they do shore up MicroPhone II's feature set in several important ways. Full System 7 support is welcome, although long overdue, as are the VT220 and VT330 terminal-emulation capabilities.

However, what's most exciting about the new release is Loran, which represents a significant advance in telecommunications-interface design. Although its practical use is limited for the time being, Loran gives us a hint of how easy it will be in the future to connect to any number of on-line information services.

— Jeffrey A. Steinberg

Get Info

MicroPhone II
★★★★
Published by: Software Ventures Corp., 2907 Claremont Avenue, Berkeley, CA 94705; 510-644-3232.
Version: 4.0.
List Price: $295.

MAPPING

GeoQuery

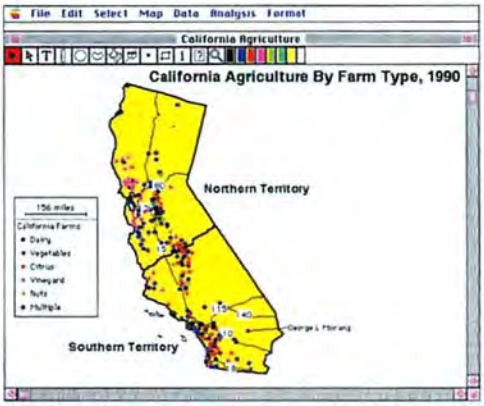
GeoQuery's mapping tool gains tighter links to spreadsheet and database programs.

If your business data makes more sense presented geographically on a map than numerically in a table or worksheet, GeoQuery may be just what you need. The latest version features System 7 support, which allows for more-powerful links to source data contained in spreadsheet and database programs as well as extended mapping tools and the unique ability to shade maps according to ZIP-code-based data.

Mapping business data often helps answer such questions as "Where did the best response to the last direct-mail campaign come from?" or "Which state tallied the highest number of sales of a particular product?" more quickly than if you viewed the data in table or worksheet format. GeoQuery uses two basic map types to present business data geographically. Pushpin maps show the location of individual data records, such as manufacturing plants, with symbols. Shaded maps use colored regions to represent statistical data. The package's built-in map collection includes all U.S. states; a collection of county-level maps is optional. GeoQuery also provides a "snooper" tool that displays the data record or data set beneath a pushpin or shaded region.

GeoQuery lacks the powerful database and data-manipulation tools included in high-end mapping packages such as Strategic Mapping's Atlas Pro. As a result, most people will complement the program by storing and manipulating data in stand-alone database or spreadsheet programs and then importing the data into GeoQuery as text files or linking to the data by using System 7's publish-and-subscribe. The program's support for Fairfield Software's ClearAccess provides access to data stored in remote-mainframe SQL databases.

GeoQuery now features a $20 optional set of external routines that allows 4th



GeoQuery is a bargain-priced tool for mapping business data. The new version includes System 7 support for tighter integration with source data in spreadsheet and database programs as well as the interstate-highway-mapping capabilities shown here.

Dimension programmers to use Apple events to tie GeoQuery to 4D databases. Although this requires advanced 4D-programming skills, the combination of the two programs allows for live two-way links between them.

Once it has acquired the appropriate data, GeoQuery uses ZIP codes or region designations to map it. By limiting its focus to mapping tools and leaving data manipulation to other programs, GeoQuery offers several advantages, particularly to mobile sales professionals. The program's streamlined interface and modest appetite for memory and disk space make it ideal for PowerBook users. However, be forewarned that the flip side of GeoQuery's minimalist approach is that it requires you to continually switch back and forth between GeoQuery and a database or spreadsheet program in order to view all the data you're in the process of mapping.

Several new tools beef up GeoQuery's data-analysis capabilties. You can use the Find Nearest command, for example, to automatically locate the customer or prospect nearest to a specified point on a map. Like previous versions, GeoQuery can combine geography into territories, making it a great sales-management tool. The new version lets you append a territory name to each record in a data file mapped with GeoQuery, a handy feature if you need to sort data by territories. Most impressive, however, is GeoQuery's unique ability to shade maps from ZIP-code-based lists by establishing links between individual data records and geographic areas on a map.

Finally, the new version includes interstate and intrastate road-mapping capabilities. U.S. interstate highways are included in the package, and U.S. routes and state roads are sold separately, priced at $150 for each of the six regions of the country or $495 for the entire continental United States.

The Bottom Line

At $395, GeoQuery is a bargain, but users doing more-sophisticated county-level or specialized boundary analysis will need optional atlas files, $100 to $295 each. These extras push the price of GeoQuery into the range of high-end packages such as Atlas Pro, from Strategic Mapping, and MapInfo, from MapInfo Systems. If you need more-sophisticated mapping features such as dot-density, bivariate, graduated-circle, or street-mapping capabilities, a high-end package is a must, because GeoQuery lacks support for such advanced features.

However, GeoQuery's streamlined approach to mapping gives it one big advantage over more-sophisticated programs. The software is small enough and fast enough to run comfortably on a PowerBook, making it a good choice for mobile professionals. If you can do without the data-manipulation tools that are built in to the high-end packages, GeoQuery is an excellent choice for viewing and analyzing data geographically.

— Jeffrey A. Steinberg

Get Info

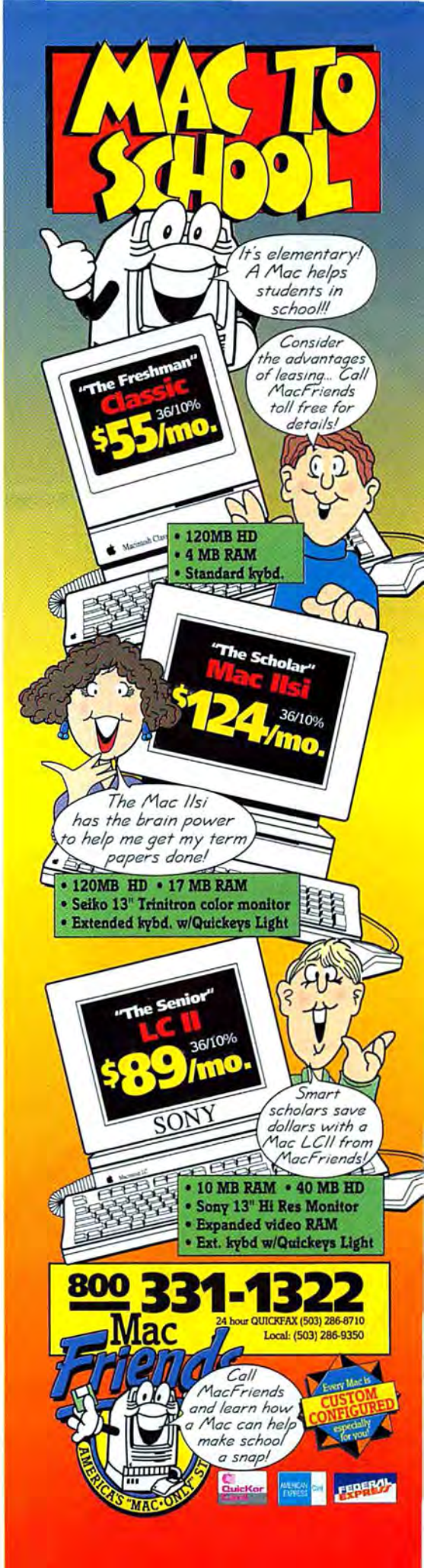
GeoQuery

★★★★

Published by: GeoQuery Corp., 475 Alexis R. Shuman Blvd., Suite 385, Naperville, IL 60563; 708-357-0535.

Version: 3.02.

List Price: $395; upgrade from version 2, $125.



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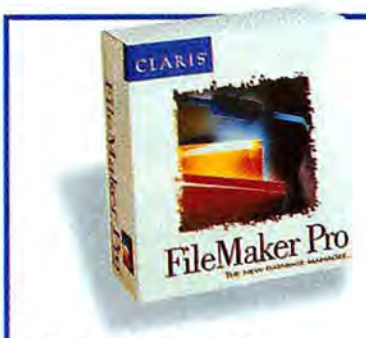
4751 ❼Persuasion 325. 1330 ❼FreeHand. 394.
7088 ❼PageMaker 494. 7541 ❼IntelliDraw 199.



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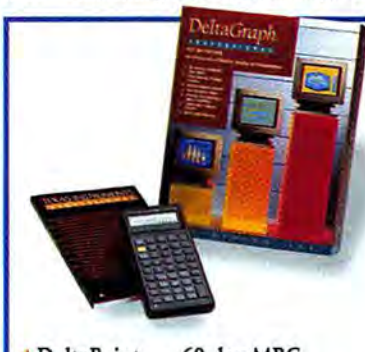

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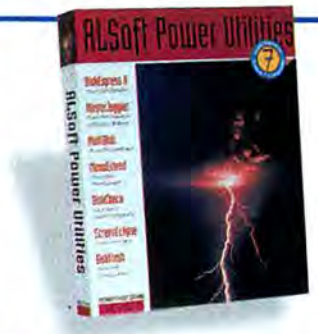

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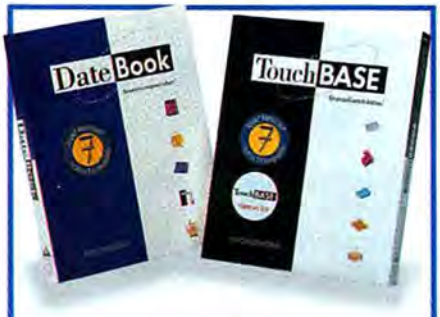

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4871 ❼Checklist 2.02 ..... 62.
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5203 ❼HELP! ..... 88.

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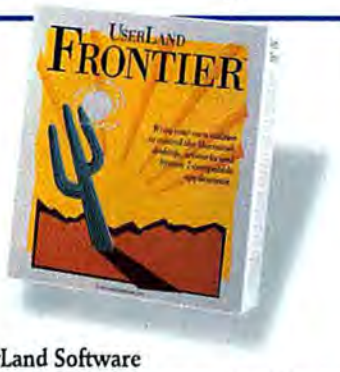
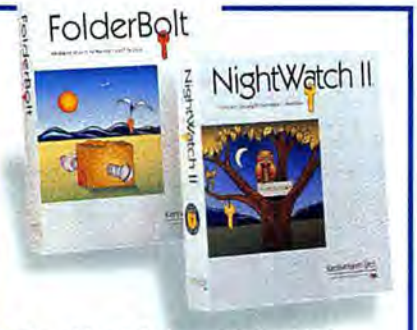


UserLand Software
4753 ❼*Frontier 1.0*—Power-user's scripting system for System 7. Write & run your own utilities to customize the Mac file system, networks & applications. "Mac users have wanted something like this since 1984," (*MacUser* 12/91) **$189.**

★TGS Systems ... 60 day MBG
6667 ❼Prograph 2.5 ..... 299.
★Thought I Could ... 30 day MBG
4843 ❼Wallpaper 1.0.2 ..... 37.
UserLand Software
4753 ❼Frontier 1.0 ..... 189.
★Visionary Software ... 30 day MBG
3887 ❼First Things First 2.1.1 ..... 41.

LEARN & PLAY
FOREIGN LANGUAGES, TRAINING, GAMES

★Abracadata, Ltd. ... 30 day MBG
5805 ❼Sprout! 1.0 *(veggie garden planner)*... 45.
★Baseline Publishing ... 30 day MBG
7785 ❼Talking Moose 4.0.2 ..... 22.
Broderbund Software
6516 The Playroom 2.0 *(CP) (color)* ..... 29.
❼Carmen Sandiego Series *(CP)*..... *ea.* 29.
8285 ❼Where/World Carmen Sandiego Deluxe 47.
3559 ❼SimAnt ..... 35.



★Kent Marsh Ltd. ... 30 day MBG
The perfect combination of hard disk & folder security. Rigorous protection at its friendliest. Perfect for single users or site licenses.
9513 ❼*FolderBolt 1.02* ..... **$71.**
1839 ❼*NightWatch II* ..... **89.**

5871 ❼SimCity Supreme ..... $35.
8266 ❼SimEarth 1.1 ..... 40.
★Centron Software ... 30 day MBG
2707 ❼Puzzle Master ..... 26.
8525 ❼Casino Master... 39. 8524 *(Color)*.... 45.
★Cyan ... 30 day MBG
6320 ❼Manhole 1.6 ..... 19.
★Davidson & Associates ... 30 day MBG
3922 ❼Talking Spell It Plus ..... 29.
2574 ❼New MathBlaster Plus ..... 34.
8278 ❼Alge-Blaster Plus ..... 34.
EARTHQUEST
8050 ❼EARTHQUEST or 3118 ❼Ecology 1.0 34.
Electronic Arts
5702 ❼4D Boxing.... 32. 1907 ❼PGA Golf.. 39.
★Expert Software ... 30 day MBG
6219 ❼Expert Astronomer 1.0 ..... 29.
Graphic Simulations
4756 ❼Hellcats Over the Pacific 1.0.3 ..... 39.
★Great Wave ... 30 day MBG
6693 ❼KidsMath 2.0 *(Color)* ..... 25.
1513 ❼ReadingMaze *(Color)* ..... 35.
4334 ❼NumberMaze .. 25. 8527 ❼*(Color)*. 35.
★HyperGlot Software ... 30 day MBG
(French, German, Italian & Spanish)
❼Word Torture *ea.* 34. ❼Tense Tutor *ea.* 38.
❼Pronunciation Tutor
(Span., Fren.) ea. 34. *(Germ., Chin.) ea.* 38.
★Inline Design ... 30 day MBG
1562 ❼3 in Three or 1944 ❼Swamp Gas. *ea.* 31.
8809 ❼Tesserae 31. 3414 ❼Mutant Beach 39.
Interplay Productions
1894 ❼BattleChess *(3D animation)*..... 29.
1893 ❼CheckMate *(infinite play levels)*..... 31.
★Learning Company ... 30 day MBG
2670 ❼Reader Rabbit 3.0 *(CP) (ages 4-7)*..... 34.
3687 ❼Super Solvers: Midnight Rescue! ..... 34.
3281 ❼The Writing Center 1.0 ..... 51.
★Leister Productions ... 30 day MBG
7126 ❼Reunion 3.0 ..... 115.
★MECC ... 30 day MBG
3963 ❼Oregon Trail 1.0..... 28.
❼Number, Word, or Super Munchers *ea.* 28.
★Microsoft ... 30 day MBG
2868 ❼Flight Simulator 4.0 *(CP)* ..... 42.
★Multimedia Library ... 30 day MBG
7312 ❼Educ. Series V. 1-Animated Relativity 105.
★Nordic Software ... 30 day MBG
8258 ❼Turbo Math Facts 2.0 ..... 24.
8257 ❼Preschool Pack - Color 2.0..... 34.
7470 ❼Jungle Quest 30. 7537 ❼Kolor Klips 37.
★Penton Overseas ... 30 day MBG
❼VocabuLearn/ce Levels I & II *(Span., Fren., Germ., Ital., Rus., Japan., & Heb.)... ea.* 35.
❼VocabuLearn/ce Level III *(Span., Fren., Germ., Ital., Rus., & Japan.)*..... *ea.* 35.
★Personal Training Sys. ... 60 day MBG
Training for System 7, Excel, Lotus 1-2-3, Persuasion, FileMaker Pro, PageMaker, Illustrator, FreeHand, Word, HyperCard, QuarkXPress, ClarisWorks & Mac ..ea. 59.
Sierra On-Line
3545 ❼EcoQuest ..... 35.
3552 ❼Leisure Suit Larry V or 7396 Red Baron 39.
★SoftStream ... 30 day MBG
4489 ❼Galactic Frontiers ..... 38.
Software Toolworks
4619 ❼Mavis Beacon Typing 1.3 *(CP)*..... 32.
★Spectrum Holobyte ... 30 day MBG
4835 ❼Tetris 1.3.. 28. 3017 ❼Wordtris 1.0. 27.
3459 ❼Falcon 2.2.2 or 8181 ❼Vette 1.0 ... *ea.* 33.

★HyperGlot Software ... 30 day MBG
❼*Berlitz Think & Talk*—Complete course teaches you to speak & understand a foreign language. Lively audio-CD dialogues, 100's of graphics & sound effects make learning fun. Incl. recording feature. *(French, Spanish, Italian & German)* **$125.**

★Strategic Studies ... 30 day MBG
3287 ❼Warlords *(empires at war)* ..... 34.
StudyWare
❼ACT, GMAT, GRE or SAT Prep ... *ea.* 29.
8098 ❼LSAT Prep ..... 35.
★Toyogo ... 30 day MBG
7624 ❼NEMESIS Go Master 5.0..... 38.
7623 ❼NEMESIS Go Master Deluxe 5.0 ..... 99.
★Voyager ... 30 day MBG
2809 ❼The Annotated Alice, 2836 ❼Hitch Hiker's Guide to Galaxy, 2820 ❼Jurassic Park *ea.* 15.

VIDEO AND SOUND
MONITORS, MUSIC, ANIMATION

Articulate Systems
7013 Voice Navigator SW w/Headset Mike.. 325.
7014 Voice Navigator SW w/Desktop Mike.. 325.
Coda Music Systems
8188 ❼MusicPros ..... 189.
5604 ❼Finale ..... 549.

Apple Computer
7072 ❼*QuickTime Starter Kit*—The quick and easy way to get started with video, sound, and animation on your Mac. Create, view, and edit movies within applications that support QuickTime ..... **$149.**

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A whole hour

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3229 ❼*SoftAT 2.5*—With SoftAT, you can run virtually any MS-DOS program on your Macintosh. You need no special hardware. With SoftAT, your next MS-DOS computer could be a Macintosh..... **$299.**

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5486 ❼Sound Edit PRO ..... 207.
4598 ❼MacRecorder Sound System PRO... 239.
5087 ❼MacroMind Director 3.1 ..... 799.
2246 ❼MacroMind Three-D 1.0..... 999.
NEC
4252 MultiSync 3FGx..... 659.
PCTV
2244 System 7 Video . 9. 2245 w/Lon's Book 25.
RasterOps
9784 RasterOps 24SX .. 649. 8944 24STV 819.
8039 Paintboard Li ..... 929.
7695 24Mx..... 1249. 7702 24MxTV ..... 1799.
8392 Sweet 16 Color Monitor..... 1249.
7699 Sweet 16 Video System ..... 1999.
7703 Sweet 16 Live Video System..... 2599.
Sigma Designs
6944 Power Portrait *(platinum)*..... 769.
Software Toolworks
5201 The Miracle *(piano teacher)* ..... 349.
Sound Source
3547 ❼Star Trek: The Logical Collection ..... 32.
3607 ❼Star Trek: The Final Frontier ..... 32.
4920 ❼Star Trek: The Bundle *(I gotta have both!)* 59.
★SuperMac Technology ... 30 day MBG
4122 VideoSpigot LC ..... 379.
4114 VideoSpigot IIsi ..... 379.
4164 VideoSpigot *(for NuBus)*..... 449.
7676 VideoSpigot Pro. 1399. 3691 Pro si 1299.
7679 Spigot & Sound *(NuBus)* ..... 779.
7678 Spigot & Sound Pro *(NuBus)*..... 1649.
7677 17" SuperMatch Multimode ..... 1149.
7675 20-T" SuperMatch Multimode Trinitron 2999.
1805 20" SuperMatch Color Display ..... 1799.
5000 20" Dual-Mode Trinitron ..... 2699.
4720 21" Platinum Two-Display ..... 1099.
1877 Spectrum/8LC or 2026 S/8si ..... *ea.* 536.
1844 Spectrum/8 Series III 536. 1851 /24 Series III 1249.
2330 Spectrum/8•24 PDQ or 2231 PDQsi *ea.* 899.

CD-ROM

Broderbund
3730 ❼Just Grandma and Me *(CD-ROM)*..... 34.
CD Technology
2321 CD-ROM Caddy ... 11. 2533 *(5 Pack)* 49.
8057 Porta Drive CD-ROM..... 579.
★Cyan ... 30 day MBG
2717 ❼Cosmic Osmo 1.1 *(CD-ROM)*..... 37.
★Ergonomic Software ... 30 day MBG
7056 ❼Panoramix Vol. 1 *(CD-ROM)*..... 69.
★Highlighted Data ... 30 day MBG
7771 ❼Webster's Dictionary *(CD-ROM)*..... 159.
6968 ❼Footage '91 *(CD-ROM)* ..... 159.
★HyperGlot Software ... 30 day MBG
(French, German, Italian, or Spanish)
❼Berlitz Think & Talk *(CD-ROM) ea.* $125.
★ICOM Simulations ... 30 day MBG
3717 ❼Sherlock Holmes, Consulting Detective 38.
★METATEC/Discovery Sys. ... 60 day MBG
6823 ❼Best of MIDI Connection..... 32.
3683 ❼Backpac Set 1 or 3679 ❼Set 2..... *ea.* 45.
★Multimedia Library ... 30 day MBG
Image Series Vol. 1-4 *(Russia/China, Tropics, Parades , Ancient Egypt).. ea.* 105.
7313 Sound Series V.1-Music for Multimedia 105.
NEC
6577 ❼CDR-37 CD-ROM Portable Drive..... 399.
6826 ❼General Reference CD-ROM Bundle 529.
6582 ❼CDR-74 CD-ROM Drive ..... 579.
Software Toolworks
3915 ❼Grolier Encyclopedia *(CD-ROM)*..... 249.
★Voyager ... 30 day MBG
3917 ❼A Silly, Noisy House CD..... 39.

COMMUNICATIONS
MODEMS, MAIL, NETWORKS

Apple Computer
7073 ❼Macintosh PC Exchange ..... 69.
7101 ❼AppleTalk Remote Access ..... 159.
7102 ❼AppleShare 3.0..... 969.

Apple Computer
7073 ❼*Macintosh PC Exchange*—Lets Mac computer users work with files stored on 3½" MS-DOS and Windows-formatted floppy disks. Move files between a Mac and a PC as easily as you can between two Macs..... **$69.**

★Applied Engineering ... 30 day MBG
8362 ❼QuadraLink *(with AE Shadow)* ..... 205.
★Argosy Software ... 30 day MBG
7872 ❼Software Bridge/Mac 2.0.1 ..... 99.
★CE Software ... 60 day MBG
8066 ❼QuickMail *(5 user)* 249. 8067 *(10)* 375.
★CompuServe ... 60 day MBG
1676 ❼Macintosh Membership Kit 1.6 ..... 25.
1673 ❼CompuServe Navigator 3.1 ..... 49.
1674 ❼Membership Kit/Navigator Bundle..... 72.
★DataViz ... 60 day MBG
4842 ❼MacLink Plus/Translator 6.0 ..... 109.
1823 ❼MacLink Plus/PC 6.0 ..... 129.
★Dayna ... 60 day MBG
DaynaPORT TRX: *(BNC or 10 BASE-T) ea.* 87.
DaynaPORT E: *(BNC or 10 BASE-T) ea.* 149.
8719 EtherPrint 339. 9888 *(10BASE-T) ea.* 339.
7888 DaynaPORT E/II-3 Adapter..... 199.
DaynaPORT SCSI/Link *(BNC or 10 BASE-T)* 269.
Dove Computer
6758 ❼DoveFax 2.0 .. 199. 3352 NuBus 229.
9634 ❼DoveFax Plus .. 265. 4111 NuBus 299.
★Farallon Computing ... 30 day MBG
Full line of EtherMac Cards available ... call
9805 ❼Timbuktu 4.0.2 or 4866 ❼/Remote 3.0 129.
6273 PhoneNET StarConnector 10-Pack .... 129.

★Berkeley Systems ... 30 day MBG
5737 ❼*After Dark 2.0V*—1992 *Macworld* World Class Award for *Utility-System Enhancement*. Stops screen burn-in..... **$28.**
2198 ❼*More After Dark (M.A.D.)* ..... **23.**
2196 ❼*After Dark & M.A.D. Bundle*..... **39.**

4869 PhoneNET Connector 10-Pk *(DIN8)*... 198.
9961 PhoneNET Card PC ..... 209.
2206 PhoneNET StarController 307..... 879.
4802 Star 357... 1025. 4814 Star 377 ... 1299.
★Freesoft ... 30 day MBG
6115 ❼White Knight 11 ..... 85.
★Global Village ... 30 day MBG
8946 ❼TelePort A300 2.1..... 129.
8945 ❼TelePort/FAX 2.1..... 145.
5327 ❼TelePort/Full FAX 2.1 ..... 219.
7730 ❼PowerPort/Bronze ..... 219.
7720 ❼PowerPort/Silver 439. 7710 /Gold 589.
Hayes
5101 ❼HayesConnect 3.0 *(modem sharing)*.. 75.
2300 ❼Smartcom II for the Mac 3.3B..... 84.
5971 OPTIMA 24 Modem for Mac..... 145.
5970 OPTIMA 96 Modem for Mac ..... 389.
Insignia Solutions
7557 ❼Access PC 2.0..... 60.
9726 ❼Entry Level SoftPC 2.5 ..... 125.
4089 ❼Universal SoftPC 2.5 ..... 195.
3229 ❼SoftAT 2.5..... 299.
3441 ❼SoftNode 1.0 105. 3454 *(10 Pack)* 699.
Logicode Technology
5525 Quicktel Xeba M9624XV ..... 169.
5524 Quicktel Xeba M9696XV ..... 369.
5523 Quicktel Xeba M1414XV ..... 399.
★Lotus Development ... 30 day MBG
7121 ❼cc:Mail Macintosh Platform Pack 2.0 339.

★ASD Software ... 30 day MBG
7085 ❼*FileGuard 2.7 (1 user)*—Protect your hard drives, applications, file/folders (including System folder) from unauthorized access, deletion, and/or illegal copying ..... **$138.**
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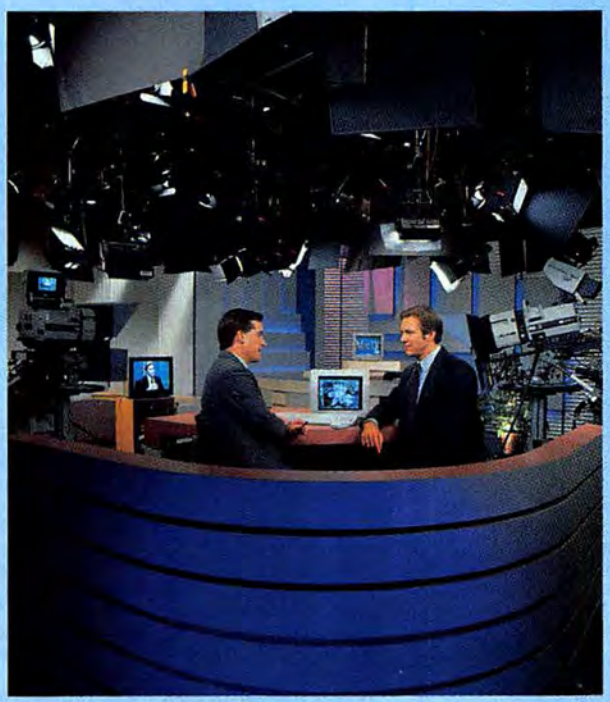

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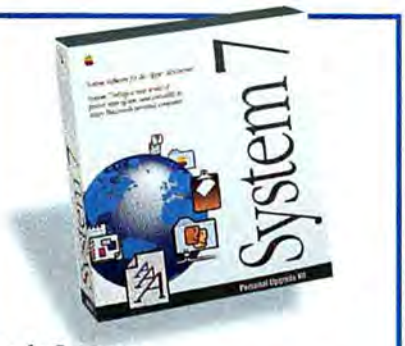

Apple Computer

1074 ❼*System 7 Personal Upgrade Kit*—Add powerful new capabilities like Publish and Subscribe, MultiTasking, Balloon Help, Virtual Memory, and more to your existing system while also making it easier to use **$79.**

IOMEGA

6499 90 MB Transportable *(reqs. interface)*. 679.
2467 90 MB Gold Std. Rem. Cart. *(Qty. 3)*... 439.
7789 ❼Mac 1B Interface *(w/Central Pt. Backup)* 39.
2466 ❼Mac 2B Interface *(with Retrospect)*.. 149.

MASS Microsystems

Diamond External Hard Drives:

2973 120 MB HD . 629. 2972 210 MB HD 1029.
2969 320 MB HD 1499. 2952 510 MB HD 2119.
5898 1" 80 MB Port...449. 5899 120 MB.. 559.
3678 120 MB Port. 569. 3663 210 MB Port. 979.
3662 320 MB Port. 1549. 3659 510 MB Port. 1999.
3657 HitchHiker Portable Drive *(40 MB)*..... 479.
3656 HH *(80 MB)* 749. 7008 HH *(120 MB)* 899.

★MDS Drives ... 60 day MBG

5533 MDS 44 SyQuest w/AutoDoubler..... 479.
5532 MDS 44 SyQuest w/Norton Utilities..... 479.
5534 MDS 88 SyQuest w/AutoDoubler..... 589.
5535 MDS 88 SyQuest w/Norton Utilities..... 589.
5529 44 MB Cart.*(3 pak)* 199. 5528 *(5 pak)* 329.
5531 88 MB Cart.*(3 pak)* 312. 5530 *(5 pak)* 512.

Peripheral Land, Inc. (PLI)

6432 3½" Optical Media..... 65.
1866 Quick SCSI Card *(requires cable)*..... 319.
8335 PLI TurboFloppy 1.4..... 295.
8327 PLI Infinity 40 Turbo *(removable)*..... 599.
9752 PLI Infinity 88 Turbo *(removable)*..... 729.
4645 PLI Infinity MO 3.5" Optical Drive..... 1649.
2864 PLI Infinity Floptical Drive *(21 MB)*..... 479.
2865 Floptical Cart. *(21 MB)* 35. 2899 *(10 pak)* $299.
2644 PLI 52 MB External Hard Drive ..... 449.
8330 PLI 105 MB *(Quantum)* ..... 599.
7933 PLI 212 MB External Mini HD..... 799.
7123 85 MB..... 419. 7124 120 MB..... 539.
7125 330 MB... 1399. 7145 520 MB..... 1699.
7140 670 MB... 1999. 7122 1.26 GB..... 2699.

Apple Computer

7101 ❼*AppleTalk Remote Access*—Remote locations can gain access to information and resources on other AppleTalk networks **$159.**
7102 ❼*AppleShare 3.0*—Share files & printers over AppleTalk networks. Supports Multitasking **969.**

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2215 3½" HD Disks *(10)* ... 15. 2241 *(50)*... 59.
4863 3½" HD Disks *(20)* with storage case.... 26.
2243 3½" Color *(10)* DS 10. 2239 *(10)* HD... 18.

★Sony ... 60 day MBG

3297 3½" DS Disks *(10)* .... 9. 6148 *(30)*..... 25.
3298 3½" HD Disks *(10)* .. 15. 6375 *(30)* ..... 42.
1603 DG60M ..... 16. 2520 DG90M..... 22.
8185 QD2040..... 14. 1895 QD2120..... 21.

★SyQuest ... 60 day MBG

5912 44 MB Cartridge *(1)*.... 68. 5529 *(3)* . 199.
5528 44 MB Cartridge *(5)*.. 325. 9728 *(10)* 639.
3603 88 MB Cartridge *(1)*... 105. 5531 *(3)* . 309.
5530 88 MB Cartridge *(5)*... 499. 3600 *(10)* 989.

★3M ... 60 day MBG

3943 DC2000..... 17. 1581 DC2120..... 23.

★SyQuest ... 60 day MBG

Cartridges for SyQuest removable drives.

5912 *44 MB Cart.*. **$68.** 5529 *(3 Pack)*. **$199.**
5528 *(5 Pack)* ..... **325.** 9728 *(10 Pack)*. **639.**
3603 *88 MB Cart.*. **105.** 5531 *(3 Pack)*... **309.**
5530 *(5 Pack)* ..... **499.** 3600 *(10 Pack)*. **989.**

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TONERS, CASES, DUST COVERS

American Power

3447 SurgeArrest Plus ..... 39.

Apple Computer

9773 StyleWriter Ink Cart. 22. 8499 *(3 Pack)* 59.
7748 Personal LaserWriter Toner Cartridge .. 87.
1115 LaserWriter II Toner Cartridge..... 105.

★Avery ... 60 day MBG

7050 Avery 5660 *(1" x 2 ⅝"-Clear Adrs.-Laser)* 32.
5392 Avery 5196 *(3½"-Disk Labels-Laser)*..... 29.

★Curtis Manufacturing ... 30 day MBG

8973 Apple Security Kit *(SL-2)*..... 22.

★I/O Design ... 30 day MBG

8812 Ultimate Classic Carrying Case..... 64.
1941 Ultimate LC Carrying Case..... 95.

★Kensington ... 30 day MBG

Full line available. Partial listing.

4973 Power Tree 20..... 24.
2559 Apple Security Kit..... 33.
6763 Mac SE Anti-Glare Filter..... 52.
3623 Apple 12" Anit-Glare Filter..... 63.

★Moustrak ... 60 day MBG

2694 Moustrak Pad *(7"x9")* 8. 2692 *(9"x11")*. 9.
2693 Moustrak Pad Low Friction *(9" x 11")*.... 10.

Hewlett-Packard

6754 HP LaserJet III—Exclusive Resolution Enhancement technology with 300 dpi sets a new standard. Prints up to 8 pages per minute as well as holding up to 5 MB of memory. Scalable typefaces and more built in.. **$1599.**

★Targus ... 60 day MBG

3617 Mac Classic/Plus/SE Case..... 59.
4015 Mac SE & Ext. Kybd. Carrying Case..... 75.

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# of Mac demos,

MASS Microsystems
3655 MASSfm 24/96 *(portable modem)*..... $185.
★Microcom ... 30 day MBG
7459 ❼CarbonCopy Mac 2.0.1 *(single)*..... 59.
★Microsoft ... 30 day MBG
9444 ❼Microsoft Mail 3.0 *(1-5 user)*..... 269.
★Practical Peripherals ... 30 day MBG
8994 2400 V.42bis Modem ..... 125.
7934 PM9600SA Modem 1.26 ..... 289.
9849 ❼SmartPack 9600 *(with Smartcom II)*. 349.
★Prometheus ... 30 day MBG
2590 ❼ProModem 2400 Mini Plus ..... 129.
4724 ❼Home Office *(24/96 w/Voice Mail)*.... 259.
8990 ❼Ultima Home Office *(144/96)*..... 489.
PSI Integration, Inc.
3143 ❼COMstation ONE 195. 3142 ❼TWO .. 299.
5340 ❼COMstation FOUR 369. 6965 ❼FIVE 549.
★Shiva ... 30 day MBG
3444 ❼NetSerial 1.35..... 275.
4347 ❼NetBridge or 4942 ❼TeleBridge ..... 399.
6555 ❼LanRover/L ..... 599.
NetModem/E *(thick, thin, 10BASE-T)* ea. 1479.
Sitka/TOPS
4188 Teleconnector *(DIN8)* 23. 2230 *(10)*. 189.
6264 ❼TOPS Network 3.1 187. 2419 *(3-Pak)* 249.
★Software Ventures ... 30 day MBG
3455 ❼MicroPhone II 4.0 ..... 209.

Hayes
5101 ❼*HayesConnect 3.0*—Share modems or other serial devices over an AppleTalk network. Includes password security, activity logging, unlimited client support, as well as System 7, and Multifinder Toolbox compatibility .. **$75.**

★Synergy ... 30 day MBG
6618 ❼VersaTerm 4.6.. 90. 6619 PRO 3.6 177.
★Technology Concepts ... 30 day MBG
6314 Fax Line Mgr. 202 119. 6315 Mgr. 203 139.
★TechWorks ... 30 day MBG
7690 ❼Net Utilities *(Aug. '92)*..... 75.
1582 ❼GraceLAN.. 275. 1584 ❼Corporate 669.
1763 ❼Hubworks-8 ..... 249.
Ethernet Cards..... call
★White Pine Software ... 30 day MBG
2404 ❼Mac 320 ..... 95. 2403 ❼Mac 330 ... 159.
2400 ❼Mac 340 ... 239. 3544 ❼Exodus 4.0 199.
★Zoom Telephonics ... 30 day MBG
1168 ❼AMX Modem *(w/❼QuickLink II)*..... 69.
2310 ❼FX9624 Send/receive Fax/Modem ..... 99.
3576 ❼FX9624V Send/receive V.42 Fax/Modem 145.
1179 ❼V.42bis Modem *(with MacPack)*..... 125.
2311 ❼V.32 Modem.. 255. 4698 V.32bis . 265.
3553 ❼Fax/Modem VFX V.32bis..... 299.

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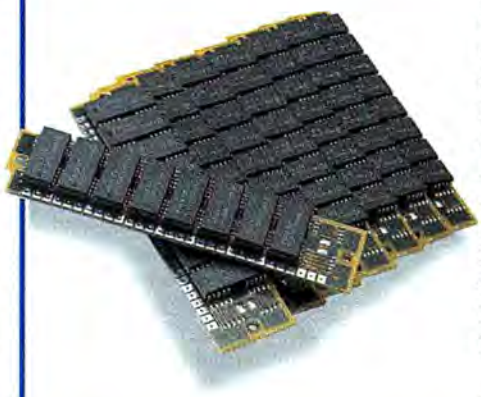

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FONTS & TYPOGRAPHY

LetraStudio 2.0 and TypeStyler 2.0

Ease of use lets TypeStyler maintain its lead over LetraStudio for display-type design.

For those who need to mangle, strangle, slant, twist, flip, flop, or warp their words (on-screen, that is), the sweeping upgrades to TypeStyler and LetraStudio are well worth considering. Each program gives you high-level tools for transforming letters, words, and shapes into sophisticated graphic art. In addition, each offers improved performance, significantly enhanced distortion controls, and direct support of PostScript Type 1 and TrueType fonts.

Although LetraStudio 2.0 and TypeStyler 2.0 share the same mission as well as the same version number, their similarities end there. TypeStyler retains its superior interface while adding System 7 support and high-end color handling. LetraStudio, on the other hand, lets you edit imported Adobe Illustrator drawings and manipulate character outlines, but it doesn't harness System 7's power and its interface is difficult to learn and awkward to use.

LetraStudio

LetraStudio offers a wealth of powerful features, including several not available in TypeStyler, but it is decidedly unintuitive. The menu items look familiar from the outside, but the commands within are arranged so strangely that it's often difficult to find what you need.

Once you get used to the awkward interface, however, you're treated to a smorgasbord of new features. The envelope concept, LetraStudio's basis for text and shape distortion, is powerful. Envelopes act as transparent, moldable shapes that can hold text and graphics. When you distort an envelope, its contents are also distorted. Version 2.0 provides a new selection of customizable envelopes you can use to create distortions resembling cans, rings, and funky ribbons.

Other enhancements include the ability to create custom envelope libraries and the ability to create multisided distortions. In addition, you can now move

Its awkward interface aside, LetraStudio 2.0 provides sophisticated tools for display-type design, including expanded envelope options that let you distort text and graphics in a variety of ways.

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REVIEWS

TypeStyler 2.0 features an exceptionally well-designed interface as well as System 7 support and top-notch tools for color handling and fill patterns.

objects in envelopes beyond envelope edges.

Two of LetraStudio's most attractive new features aren't available in TypeStyler and, for some users, may compensate for LetraStudio's hamstrung interface. The first is the ability to make text objects into graphic objects, complete with Bézier controls that let you edit the character outlines. Want to make a Helvetica *H* look like it's melting? No problem — LetraStudio lets you manipulate the outlines of your text-cum-graphic to your heart's content.

The second major LetraStudio feature not available in TypeStyler involves files imported in Adobe Illustrator format. Here's the best part: Once you've placed an Illustrator graphic, you can manipulate and transform it as if you had created it in LetraStudio. Whatever the source program, your illustration will transfer as editable line art, with 1-point lines defining its contours. Fills, masks, and text, however, don't transfer. Although you can use Illustrator or FreeHand images in TypeStyler, you can't edit them.

TypeStyler and LetraStudio can export files in Illustrator format, so you can further transform text and graphics outlines in Illustrator or FreeHand. Additionally, each program can export files in EPS and other formats for use in page-layout applications.

LetraStudio also offers a few conveniences TypeStyler doesn't. As you move objects, it lets you view the objects themselves, not just their bounding boxes, and you can have more than one document open at a time. LetraStudio's precision controls will appeal to the more quantitatively inclined. Additionally, LetraStudio is bundled with the Character Chooser, a kind of enhanced Key Caps DA.

TypeStyler

TypeStyler is by far the easier to use of the two programs. If you're familiar with any of the major page-layout or drawing programs, you'll feel right at home with TypeStyler's tool palette, standard Mac menu organization, and intelligently designed dialog boxes.

TypeStyler makes it easy to get to work right away. Click with the text tool, and a few nested dialog boxes present you with the key choices — font, shape, style, color, fill patterns, word spacing and letterspacing, and so on. This saves you from rooting around in menus, looking for basic formatting controls.

But don't let the program's easy interface fool you — TypeStyler is no lightweight. Its new double-Bézier controls are a welcome addition. Using Bézier curves is the standard way to control shape distortion in high-end illustration packages, and Bézier curves are integral to both TypeStyler and LetraStudio. Like LetraStudio, TypeStyler gives you enhanced control over shapes by supporting multiple Bézier controls along a line.

TypeStyler now supports 24-bit color and lets you do spot- and process-color separations. Although TypeStyler lacks direct support for Pantone colors (which LetraStudio provides), its new flexible Custom Color Editor lets you create colors based on the RGB, CMY, or CMYK color models.

Professional designers will appreciate TypeStyler's new Overprint feature. When you're printing on a color press, even minor registration problems can

cause ugly, unwanted gaps where one color should meet another. To avoid these problems, you can choose to have one color overprint another where the two colors meet — the overprinted color will fill in any unintended gaps. Although Brøderbund recommends that you use more-sophisticated trapping software for complex designs, TypeStyler's overprinting feature can come in handy for relatively simple projects.

Letter Fusion is a TypeStyler innovation. With this option selected, you can treat a group of letters as a single object for styling purposes (graduated fills, for example, spread across a group of letters instead of filling each letter separately). Because LetraStudio doesn't allow for patterned or graduated fills at all, this kind of feature in that program would be a moot point.

Unlike LetraStudio, TypeStyler takes advantage of System 7's capabilities. It claims to be 32-bit clean, and it offers Balloon Help and publish-and-subscribe. TypeStyler is also bundled with Adobe Type Manager.

The Bottom Line

LetraStudio offers key features not available in TypeStyler, but you pay a price — the program suffers from a steep, often frustrating learning curve.

For those whose primary concern is ease of use, TypeStyler is the hands-down winner. With its superior color-handling options, wide variety of editable fill patterns, and System 7 smarts, TypeStyler may be, er, just your type.

— Shelley Cryan

Get Info

LetraStudio 2.0

★★★½

Published by: Letraset USA, 40 Eisenhower Drive, Paramus, NJ 07653; 201-845-6100.
Version: 2.01.
List Price: $249.

TypeStyler 2.0

★★★★½

Published by: Brøderbund Software, Inc., 500 Redwood Blvd., P.O. Box 6121, Novato, CA 94948; 415-382-4400.
Version: 2.0.1.
List Price: $219.95.

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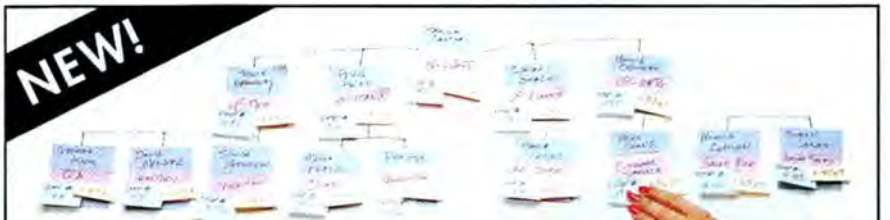

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SCANNERS

Polaroid CS-500 Digital Photo Scanner

Polaroid's one-of-a-kind scanner makes fast work of capturing color snapshots.

For those who are looking for a way to digitize large quantities of color snapshots, whether for image databases or for DTP, the Polaroid CS-500 Digital Photo Scanner is a good, albeit pricey, choice. The $3,995 color scanner processes images as large as 4 x 6 inches in a fraction of the time required by the fastest flatbed scanners. Moreover, even the most fumble-fingered users will find the scanner simple to operate and its accompanying software easy to use.

Bigger Than a Bread Box?

It's surprising to find a scanner that features such quality, speed, and ease of use, but then the CS-500 is unique among scanners. To begin with, it doesn't look like any other scanner. The CS-500 is a closed box with a thin slot. You position a photo on a sloping surface that leads into the slot and ease the photo in until the device's rollers engage it. An adjustable guide tab keeps the photo straight as it slides into the scanner. The CS-500 accepts original documents as large as 8.5 inches long, 4.25 inches wide, and .03 inch (8 mm) thick. There's a plastic carrier that holds originals less than 2 inches long or wide. The CS-500 connects to the Mac's SCSI port.

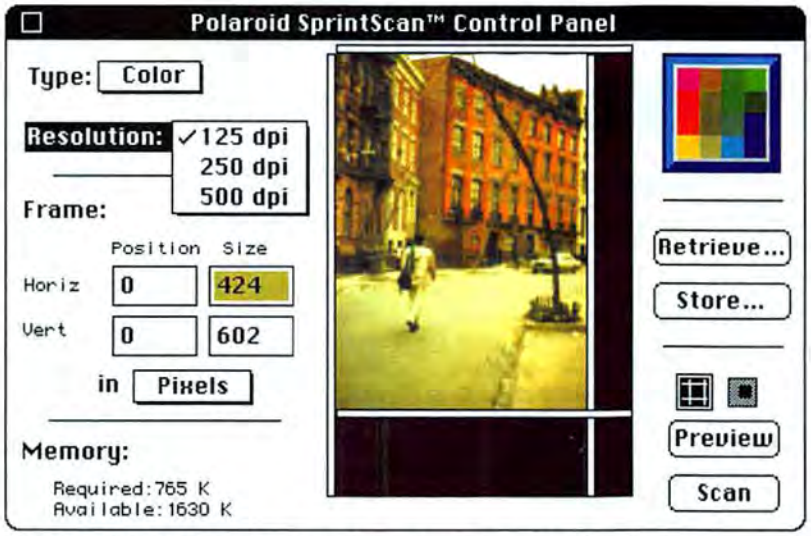
The software of the Polaroid package comprises an extension, the SprintScan application, and an Adobe Photoshop plug-in. SprintScan and the plug-in can each drive the scanner, and they carry an almost identical feature set.

Scanning is quick — it takes only about 9 seconds to get a preview image on-screen. Settings are available for both 24-bit color and 8-bit gray scale as well as for resolution and the area of the scan. You can save images in TIFF, PICT, and RGB formats.

You can choose from three resolution settings: 125, 250, or 500 dpi. Polaroid plans to offer additional resolution settings in future revisions of the software. We'd like to see a 72-dpi setting to match screen resolution. The CS-500 took 10 seconds to scan a 4-x-6-inch color image at 125 dpi, 22 seconds to scan the image at 250 dpi, and 63 seconds to scan it at 500 dpi. By contrast, the Hewlett-Packard ScanJet IIc — one of the fastest flatbed scanners on the market — took 4 minutes and 30 seconds to scan a 4-x-6 inch image at 500 dpi.

The CS-500 achieves its fast speed with special CCD (charge-coupled device) elements in its scan head. Most other scanners also use CCDs, but Polaroid has significantly increased the light sensitivity of its elements. As a

The Polaroid CS-500 Digital Photo Scanner is custom-designed for digitizing 4-x-6-inch color snapshots. Image quality is impressive, and the scanner can process images in a fraction of the time required by color flatbed scanners.



The Polaroid CS-500 package includes software for controlling the image resolution and the area of a scan.

result, the CS-500 can pass a photo over the CCDs at a much faster rate than other scanners can — without sacrificing scan quality.

Overall, we were impressed with the scan quality of the CS-500. Images scanned at 500 dpi were sharp and detailed. Most users will opt for the 250- or 125-dpi settings, because images scanned at 500 dpi result in gigantic files — a 4-x-6-inch color scan at 500 dpi created an 18-megabyte file, for example.

The CS-500 produced excellent-quality scans on a variety of test photos. Skin tones were realistic and colors well balanced. In images with extreme highlights, we noticed a tendency for neutral tones to shift toward green. In fact, if we scanned a black-and-white photo in Color mode, the white and grays took on a pale-green hue. The SprintScan application provides an auto-contrast adjustment, but it only made things worse. We corrected the problem by using the Levels command in Photoshop to perform an automatic contrast adjustment.

The CS-500 carries color processing on-board to ensure that the colors it sees are accurate according to an HDTV standard (called the CCIR REC709 Gamma Corrected RGB). This standard will gain importance as color-management software becomes available for the Mac, allowing it to translate the colors from the CS-500 to any output device.

Until then, you can control tone, color, and sharpness settings with the SprintScan or plug-in software. Polaroid ships several preconfigured-settings files for different types of photos, from normal 35mm prints to instant Polaroid prints. You can tweak these settings or create your own and save them for later use.

The Bottom Line

At $3,995, the Polaroid CS-500 Digital Photo Scanner costs roughly three times as much as a quality color flatbed scanner. For those who need an efficient way to process large numbers of 4-x-6-inch images, however, the CS-500 is a good buy — no other scanner is as fast or as easy to use. The quality of printed images digitized with the CS-500 won't suit the standards of many professional publishers (let's face it, there's only so much you can do when you're starting with a color snapshot), but the scanned-image quality is among the best we've seen, making the CS-500 ideal for any image-database application.

— Paul Yi

Get Info

Polaroid CS-500 Digital Photo Scanner

★★★★

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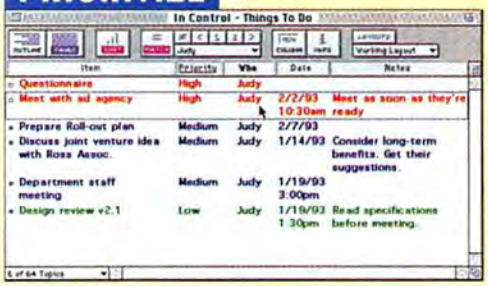

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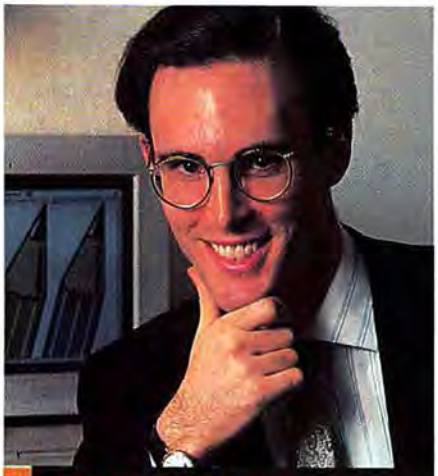

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MEANS BUSINESS

PROGRAMMING

Prograph

Object-oriented Prograph spares developers the thorny process of coding in C.

Prograph is a visual programming system that lets you sidestep the complexities of learning C or Pascal. With far more power than the Mac's other accessible programming system, HyperCard, the object-oriented Prograph is a true programming language that's ideal for budding professional programmers or for in-house corporate developers looking for a way to produce custom applications quickly and painlessly.

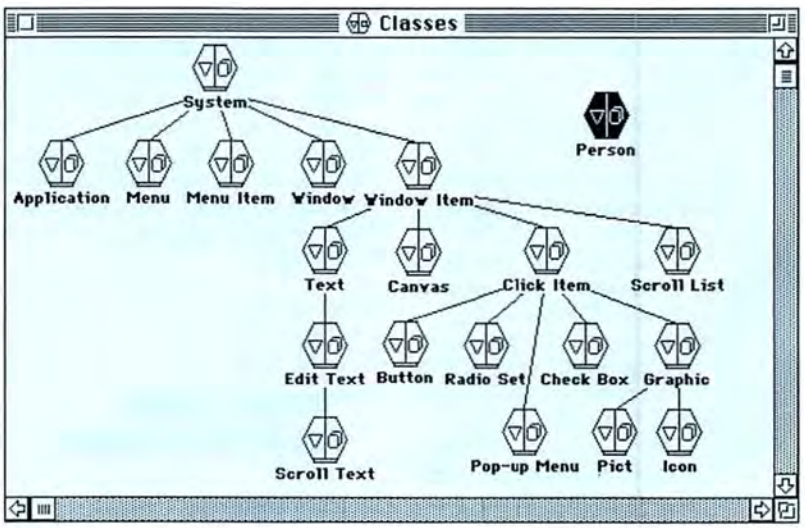
Click-and-Drag Programming

Rather than requiring that you type cryptic code to develop applications, Prograph lets you simply click to create operation icons and drag to create links between them. The flow of your program is visible on-screen, just as in a flowchart, so you can see where data is coming from and where it's going. Prograph provides dozens of iconic functions, including standard programming constructs such as loops and IF/THEN tests as well as Mac-specific functions such as alerts and dialog boxes.

For putting an attractive face on your application, Prograph provides a graphical-interface builder that lets you create windows and menus in minutes. This feature is enhanced in version 2.5 to provide a finer degree of control over interface details such as pop-up menus and outline fonts. In general, you'll want to stick to creating standard interface elements: It's quite difficult to create nonstandard elements such as split-pane windows or custom controls with this program.

The new version fully supports System 7, as do the applications it generates, which are 32-bit clean and support outline fonts and IAC. In addition, Prograph's maker, TGS Systems, has devised one of the easiest methods we've seen for incorporating Balloon Help.

Prograph 2.5 sports a compiler (new with version 2.0) as well as an interpreter. The compiler enables you to build stand-alone double-clickable applications



With Prograph, you can sidestep the complexities of developing in C or Pascal and build applications graphically. Prograph's class icons and inheritance links, shown here, are hierarchically arranged. The Prograph system is an excellent learning tool for novice programmers as well as a good choice for corporate software developers.

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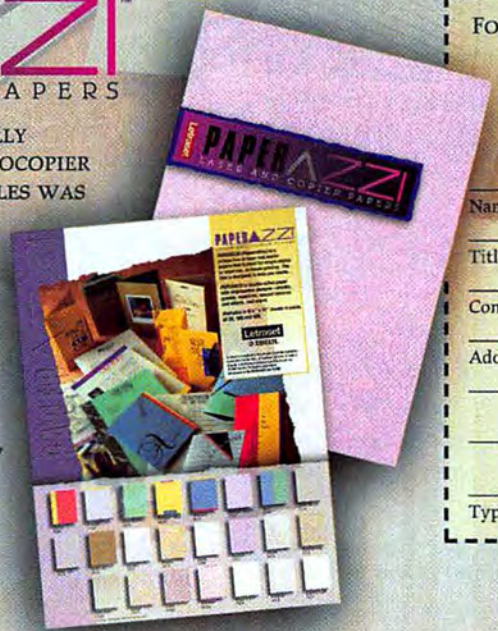

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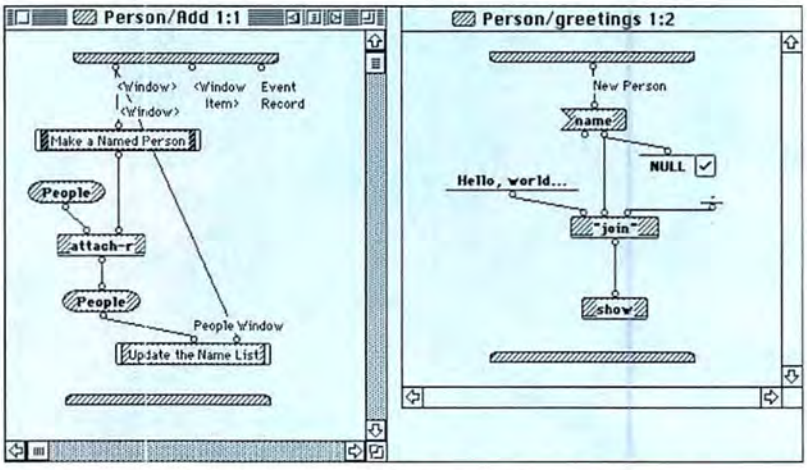
you can distribute to users who don't own Prograph. Moreover, for creating finished applications, the compiler is much faster than the interpreter, which is best used during the development phase. When the interpreter runs through an application, for example, it reads one icon at a time, executes whatever the icon instructs (adds two numbers, for instance), and then continues to the next icon. By contrast, the compiler reads all of an application's icons at once and generates 68000 machine code for the entire program.

Poky Performer

Even though a compiled Prograph application is much faster than an interpreted one, it's still going to be slower than the same application written in C by a skilled programmer. In addition, compiled Prograph applications tend to be much larger than their equivalents in C. The trade-off is that the program's visual approach lets you develop applications many times more quickly than you are able to when using C.

Maintenance is also a concern when large applications are involved. Hefty C applications, for example, may contain 100,000 lines of code or more. Applications of this size can be difficult to maintain. Prograph includes the comment, the most common type of source-code



A true object-oriented programming system, Prograph has data-flow diagrams that show you where your data is coming from and how it travels through your application.

In-house production v

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W E M A K E O R D I N A R Y C O M P U T E R S

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management, and the program can automatically propagate comments from routine to routine. But this quickly proves inadequate for very large applications. Standard third-party support tools such as object browsers, source-code analyzers, and revision-control systems don't work with Prograph.

Prograph provides good debugging facilities. You can execute an application one step at a time and watch as it progresses from icon to icon. You can also view data passing through the links that connect the icons. You can even freeze an application, modify it by adding and removing icons or rearranging links, and then resume execution. Neither C nor Pascal provides this degree of freedom for experimenting on programs while they are running.

Prograph claims to be object-oriented, and we were pleased to find that it does contain the three defining features of a true object-oriented programming system — encapsulation of data and routines into objects, inheritance between objects, and polymorphism.

Because you can't go to your local bookstore and buy a book on programming in Prograph, as you can with C or Pascal, a good manual is essential. Prograph comes with two: a tutorial and a reference manual. The tutorial does an excellent job of teaching the Prograph system, and the reference manual thoroughly covers all the details. TGS Systems also provides excellent technical support by phone or fax as well as help over most major on-line services.

At $495, Prograph is expensive compared with other entry-level programming languages, but its power and ease of use make it worth the money. Version 2.5 runs on any Mac with System 6.0.4 or later, 2 megabytes of RAM, and a hard drive. For optimal performance, we suggest a Mac II-class machine.

The Bottom Line

Prograph is an innovative programming environment that lets developers build applications much more quickly than they can with C or Pascal, and they can do so without extensive knowledge of Apple's 3,000-page programming tome, *Inside Macintosh*.

Although the system's limitations on application size and performance mean that you won't find many developers of shrink-wrapped applications using Prograph, we heartily recommend it to in-house corporate programmers who need to develop custom applications quickly.

— David Shayer

Get Info

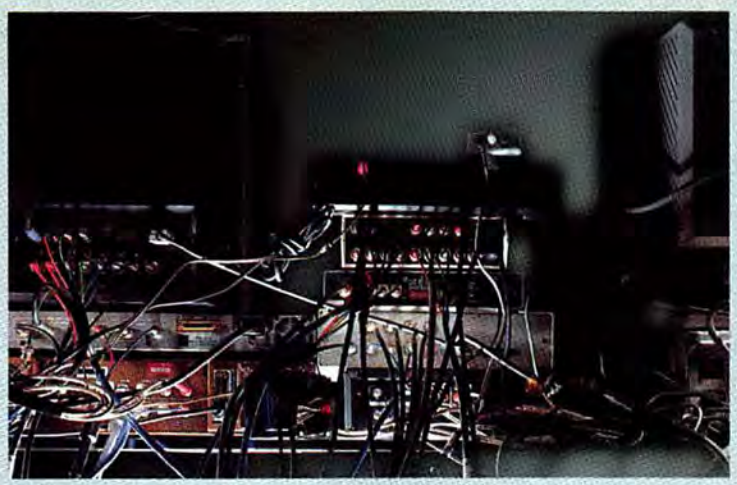
Prograph

★★★★½

Published by: TGS Systems, 2745 Dutch Village Road, Suite 200, Halifax, NS B3L 4G7, Canada; 902-455-4446.

Version: 2.5.

List Price: $495.



s. outhouse production.

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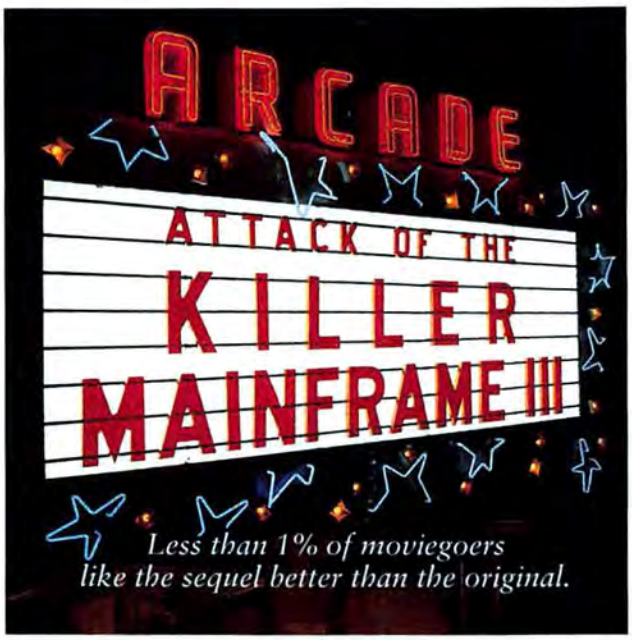

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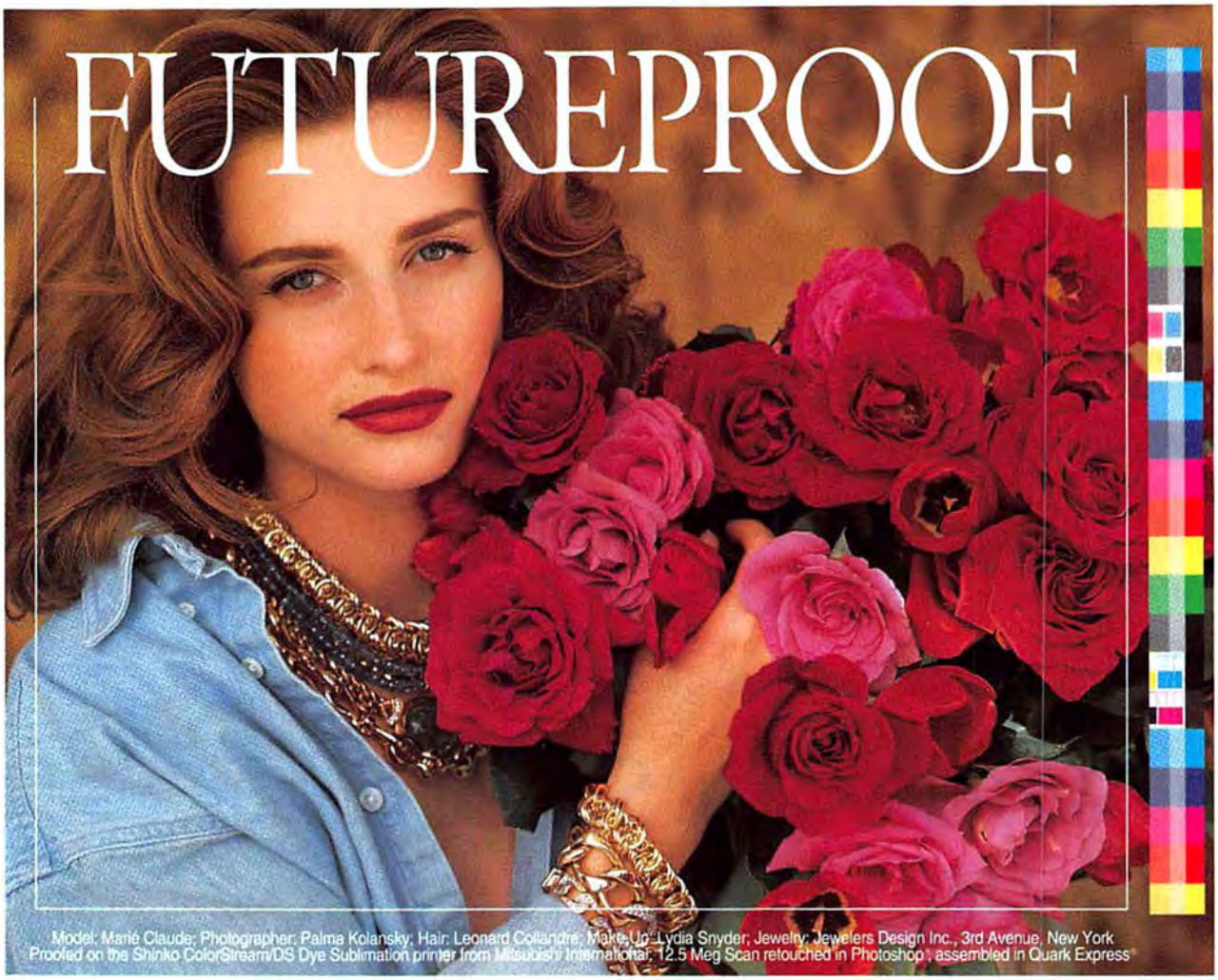

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QUICK CLICKS

SuperLaserSpool

★★★★

Although it may be true that all things come to those who wait, nobody ever said waiting was fun. With SuperLaserSpool (SLS), the waiting is over. This timesaving print spooler now works with System 7. Improved speed, support for color printers, and the ability to print to more than one printer simultaneously are new features that will help keep SLS on many people's must-have list.

Print spoolers help you work more efficiently by letting you use your Mac while documents print in the background. Although spooling can't speed up total print time, it significantly shortens the screen freeze you otherwise endure until your document finishes printing. The time savings can be significant; a seven-page Microsoft Word document printing to a GCC Business Laser Printer with SuperLaserSpool returned control to our IIcx 1.25 minutes earlier than it did without a spooler, and SLS saved more than 11 minutes on a graphics-intensive nine-page MacInTax document. Considering the number of times you print each day, SLS just may open up enough time to make a dent in your perpetually overflowing in box.

But why buy SuperLaserSpool when you get Apple's PrintMonitor spooler free with your system software? PrintMonitor works only with StyleWriters, LaserWriters, and some third-party compatibles; SLS can spool to a larger set of laser, dot-matrix, bubblejet, and inkjet printers (including the HP DeskWriters). SLS also works with PageMaker, which historically has had difficulty talking to PrintMonitor. If you can't use PrintMonitor, SuperLaserSpool is a great investment.

Additionally, unlike PrintMonitor, SLS lets you preview print jobs for all applications (not just those with a Page Preview feature), send jobs simultaneously from the same computer to different printers, and spool print jobs while your printer warms up. SLS is often slightly faster than PrintMonitor, although not enough to justify a switch on that basis alone.

SLS is easy to install and use. As a system extension, it loads automatically when you start your Macintosh. SLS takes care of spooling while you print as you normally would. An included DA, Laser Queue, lets you easily check on, reorder, or remove print jobs. Although SLS has trouble coexisting with some fax-modem software (you need to deselect the fax driver in the SLS setup screen) and there's a glitch with printing graphics in Microsoft Word 5.0, SLS performs flawlessly with most applications. The documentation is excellent, as is the technical support.

Fifth Generation Systems, Inc., 10049 N. Reiger Road, Baton Rouge, LA 70809; 800-873-4384 or 504-291-7221. Version 3.0. $149.

– Shelley Cryan

Mission: Thunderbolt

★★★★

Some say the best computer games are those that cause players to lose sleep, shun family and friends, and neglect vital aspects of personal hygiene. "I made myself wretched for six days!" an adolescent identified only by initials might testify in a press release. Although we haven't seen the press release from Casady & Greene, we expect no less praise for Dave Scheifler's Mission: Thunderbolt.

The game takes place in a post-apocalyptic world invaded by aliens. You must fight or charm your way through a multitude of beasties that inhabit 30 levels (some of which are side warrens) of a laboratory. Your mission is to recover an antimatter device that can make hash of your enemies. Along the way, you pick up weaponry, armor, strange devices, and pills of various colors (which occasionally prove harmful).

The keys to survival in Mission: Thunderbolt are forethought and cunning. Unlike in many other adventure games, there's no single way to do things correctly. For example, say you need to get around a threatening collection of nasties to reach the floor below: You can tough it out with your available weaponry, pound a hole in the floor and jump through, or set a group of recently converted friendlies on the baddies while you take a snooze.

With this much flexibility, Mission: Thunderbolt won't be one of those games you play just once and then put onto the shelf. Each new game generates different character attributes, floor plans, and pill colors plus a new distribution of weapons and beasts.

This complexity brings with it some frustration. The manual provides virtually no guidance, so you learn as you play. You may spend hours repeating idiotic tasks before you realize there are more-subtle workarounds. You can save games in progress, but points are deducted for each save and there is no Revert command.

Will Mission: Thunderbolt cause our apocryphal teen to become a complete social misfit for the duration of play? Without question. If playing computer games until you're bug-eyed is your idea of a good time, you could hardly be in better company.

Casady & Greene, 22734 Portola Drive, Salinas, CA 93908; 408-484-9228. Version 1.0. $59.95.

— Christopher Breen

Timeslips III

★★★★

Timeslips III is a time-tracking and billing package aimed at lawyers, consultants, and others who bill for their time. Although its interface isn't perfect, Timeslips is time-tested, with a feature set that has benefited from user input. We have yet to find another time-billing package as powerful and flexible.

Most Mac programs include as many features as possible so users won't have to switch among several applications. Timeslips has the opposite philosophy. For example, you use TSTimer to enter daily activities, TSReports to print bills, TSImport to import data, and TIM PCtoMac to get listings from a Timeslips PC file. To help you deal with these four applications, you get a clearly written manual and a tutorial.

Initial setup (in the TSReports application) involves entering lists of users (as many as 250 staff members who provide services), clients (as many as 3,400), activities (services you sell or expenses you incur), and rates. You can make additions on the fly and also import data from databases, spreadsheets, text files, or a Sharp Wizard by using TSImport.

TSTimer, the mainstay of the package, is available as a DA for System 6 users or as an application that's fully System 7-capable. For each time slip, you enter the name of the staff member, client, service performed, optional project information, time spent, and rate charged.

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Each time slip has a built-in stopwatch with start and stop buttons you click to accumulate time on the slip. Developing the habit of clicking on these buttons when you begin and end an activity is the key to using Timeslips effectively.

You can also use time slips to enter an expense or an item being sold. The time slip automatically calculates the total by multiplying the quantity by the unit price. Whether for time or expenses, a time slip can be classified as billable, unbillable, no charge, on hold, or summary (which summarizes the charges on related time slips).

TSReports lets you enter payments and generate bills and reports (accounts receivable, aging, and time analysis) and has extensive tools for creating custom layouts. You can archive and purge outdated time slips and can combine multiple files so that slips from all of them can be included in reports or billing. Invoices can contain detailed or summary listings for services and can group expenses by project, date of services, or any other reasonable sort criteria.

The Timeslips interface could use some polish. Users could save time if the functions of TSTimer and TSImport were merged into TSReports. And pop-up menus would be quicker and more elegant than the current combination of buttons and dialog boxes for selecting data items in TSTimer.

Otherwise, as with any time-management system, Timeslips' weakest link is the user. If you're not committed to making data entry part of your daily routine, don't waste your money buying the package. If you are, you'll find Timeslips a full-featured, flexible choice.

Timeslips Corp., 239 Western Avenue, Essex, MA 01929; 800-338-5314 or 508-768-6100. Version 2.1. $299.95.

— Darryl Lewis

Nolo's Living Trust

$\$\$\$^{1/2}$

To celebrate a recent anniversary, legal publisher Nolo Press distributed T-shirts bearing the slogan "Annoying Lawyers for 20 Years." It's with this sentiment in mind that Nolo has released its latest do-it-yourself legal program, Nolo's Living Trust, which follows in the footsteps of its popular WillMaker program.

Living trusts are gaining popularity as an alternative to wills, because they let your heirs avoid probate, a lengthy and costly process that Nolo says is often unnecessary. By drawing up your own trust, you can also save a bundle in legal fees, which is presumably the part that annoys lawyers.

Using Nolo's Living Trust is very simple: You must answer a series of questions (including specifying your state of residence, which affects some provisions) and then review the document the software creates. Nolo leaves nothing to chance, however. Before you can print and sign your trust, you have to read through a tutorial on registering and storing it.

Nolo has done a good job of creating a program that doesn't overestimate users' legal knowledge. The well-thought-out on-line help offers clear examples and detailed explanations of every step. Some logical and legal inconsistencies (such as allocating more or less than 100 percent of your assets to your beneficiaries) are red-flagged. And, as with WillMaker, there's an excellent manual and reference book.

Even if you don't feel comfortable using your computer to arrange your legal affairs, becoming familiar with Nolo's Living Trust is an inexpensive way to educate yourself on estate planning before you make an appointment with your lawyer.

Nolo Press, 950 Parker Street, Berkeley, CA 94710; 510-549-1976. Version 1.0.2. $79.95.

— Victoria von Biel

Composer's Mosaic

$\$\$\$\$^{1/2}$

The programming team at Mark of the Unicorn has spent the last three years trying to create a music-notation and -publishing program that can satisfy everyone from novice songwriters to professional music copyists. Amazingly, Composer's Mosaic meets this goal. It's automatic enough to allow novices to get notes on paper easily, but it additionally provides state-of-the-art tools for manipulating subtle details. And unlike Mark of the Unicorn's previous notation program, Professional Composer, Composer's Mosaic is *very* stable — it supports multiple files; works with all

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Character Style Sheets	Yes	No
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NEW ON THE MENU

QUICK CLICKS

Macintosh/monitor combinations; is compatible with fonts, extensions, and control panels; and offers complete System 7 support.

Central to Mosaic's power is the concept of *voice*. A voice is a part or phrase that you can isolate and reuse on different staves (assigning it to various transpositions if you like). You can also layer multiple voices on a single staff.

Mosaic imports MIDI channels as voices and exports voices to MIDI channels for seamless integration with sequencing programs — the easiest way yet to make MIDI data show up as the right notes.

In addition to the ability to import MIDI files and live MIDI data painlessly, Mosaic has a click-and-drag WYSIWYG interface that makes it easy to enter notes and other musical elements from movable palettes directly onto staves — with unlimited Undo capabilities to help you recover from mistakes. Mosaic's multiple views make it easy to view the same piece as a score, its parts, or a page layout, and part generation from scores is automatic.

Mosaic also offers templates that behave like musical "style sheets," autolayout preferences, easy text placement, and even a new lyric window. Lyrics can be typed in this window, formatted, and then applied to as many voices as you desire.

Additional sophisticated features include cross-staff beaming, configurable palette symbols, unlimited symbol placement, any number of staves (depending on memory), adjustable note-stem length, flexible measure numbering, and complex meters. And for ultimate tweaking flexibility, anything you've entered can be dragged to a new location.

By the time you read this, version 1.1 of Mosaic will be available. This version will have full compatibility with Professional Composer files (the current version can read only parts of Composer files), and future versions will reflect Mark of the Unicorn's efforts to become highly responsive to user requests, incorporating features such as a draw environment for creating nonstandard symbols. Because Mosaic is easy to modify and upgrade, we expect it to continue to improve.

Mark of the Unicorn, 1280 Massachusetts Avenue, Cambridge, MA 02139; 617-576-2760. Version 1.0.5. $595.

— Ken Gruberman

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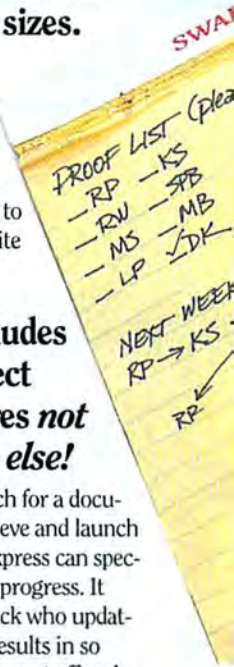

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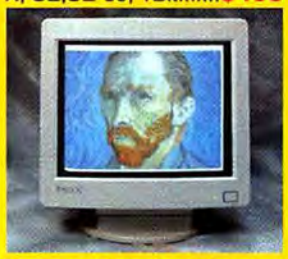

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Staying On Time

Staying organized is the best way to finish a job on time. Project-management software can help you stay on track.

Effective project management is a lot like chess: At any given moment, there's a single, optimal decision to be made, and you always need to know where you are and have a plan for where you're going. Keeping all the parts of your projects on schedule and in the proper order is what project-management software is all about, and it doesn't matter if your project is building a car or preparing a banquet.

Formal project management places a series of tasks in a logical order and analyzes their relationships to achieve an optimal schedule. But not everyone thinks or works formally. Some people just need a list of tasks and a simple Gantt chart. Others want to micromanage every detail.

Although you can spend $4,000 or more for a project-management package, most users don't do project management as their full-time job; their goal is to get work done, and software is just a tool to keep things on track. With that in mind, we focused on the seven popular off-the-shelf packages: AEC Information Manager, Fair Witness, FastTrack Resource, KeyPlan, MacProject II, Micro Planner Manager, and Microsoft Project. Priced between $250 and $700, they're within most users' budgets and offer enough diversity in their approaches to fit nearly anyone's work style. We would have included an eighth package, Scitor's Project Scheduler/4, but the publisher asked to be excluded from this story, pending a new version.

Most projects follow four basic steps from beginning to completion: brainstorming, planning, resource management, and performance evaluation. Although you may not think or work in such a formalized way, a little perspective will probably reveal that your work often follows this pattern.

PHOTOGRAPHY: PIERRE-YVES GOAVEC

Brainstorming

The moment people see a progression, they start thinking linearly. Brainstorming avoids this pattern by identifying tasks that are independent of when they should occur, how long they should take, or who should do them. Sometimes the project manager and a glass of beer suffice as a brainstorming team, but even small projects involve brainstorming.

Planning

During a planning session, your goal is to put the important items from your brainstorming session into some kind of logical sequence with an estimate of how long each task will take. The completed plan, or network, shows what needs to be done when, to ensure that the project is completed on time.

Resource Management

Once you have a plan, you have to assign resources (people, equipment, facilities, and the like) to do the individual tasks. At this stage, you often have to return to the plan and readjust it, because you may have overloaded some of your resources, such as scheduling someone to work 160-hour weeks.

Performance Evaluation

After the start date, most plans will change daily. Plans are basically educated guesses at real-world performance, but to stay on top of things, you need a way to compare your actual performance with the plan. Project-management software's ability to track performance, to reveal problems, and to let you replan around hitches is what can make all of your planning efforts meaningful.

BY DANIEL W. RASMUS

AEC Information Manager

AEC Information Manager (see Figure 1) isn't meant for project planning or task generation. It's a tool for managers who are overwhelmed by data. Although AEC hasn't updated the product in years and the user interface is a bit dated, AEC Information Manager offers busy managers an easily customized environment for managing their project information.

Like Fair Witness, AEC Information Manager expands into custom data areas. If you want a phone number or address, just type one in. Even 32K note fields pop up for easy entry.

The program's note-card-style data-input format should be intuitive for nontechnical users. It's easy to create new fields: Click on an empty field area, type a new field name — you can format it if you like — and start entering data. Because of AEC Information Manager's nonstandard Mac interface — for instance, it supports three fonts, which aren't found on a font menu — report development takes a little getting used to, but once you've created a few reports, future ones pour out effortlessly. Custom reports can include selected columns, custom sorts, and any number of Gantt-style date lines.

AEC Information Manager provides users with enough database-program features that they shouldn't need 4th Dimension or FileMaker Pro. Its custom reports, user-defined selections, and good graphics can help keep any project on schedule. Don't use this tool without a good project planner/manager for creating the initial project, but keep it close at hand to manage all your related data.

[*At press time, AEC Software told us that AEC Information Manager version 2.0 is in the works and scheduled for a fourth-quarter release. The new version will include standard resizable, movable windows; full font support; calculated fields; and on-screen editing of Gantt charts. — Ed.*]

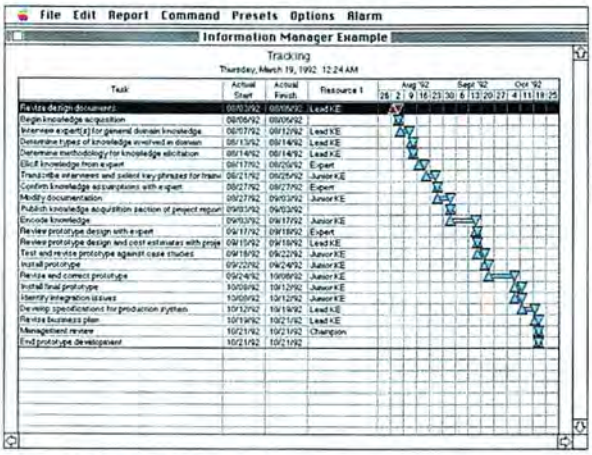

Figure 1: AEC Information Manager enhances large project-management packages with support for user-defined fields, sorting, alarms, and custom Gantt charts. It's an excellent supplement to a full project-management package when you're overwhelmed with data.

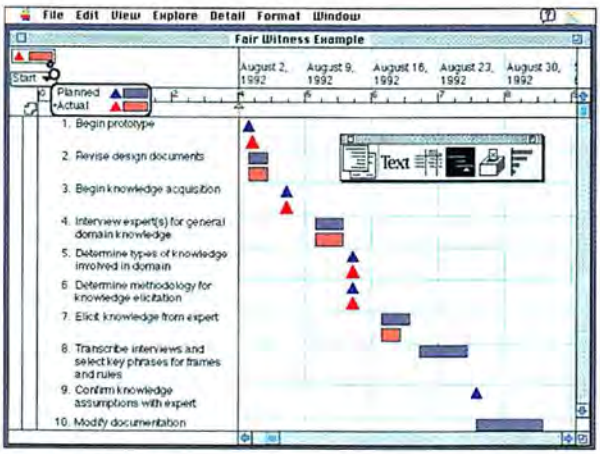

Figure 2: Fair Witness occupies a unique niche in project management. It's an excellent brainstorming tool that lets you quickly organize your thoughts into an outline and a simple project schedule. It also supports a wide variety of data types, including icons, graphics, and QuickTime movies.

Fair Witness

Brainstorming is difficult, especially for the person who has to turn the scrawl on the office whiteboard into a computerized plan. Fair Witness eliminates that step by turning the whiteboard into software.

Once you have some logical categories on the electronic whiteboard, you turn on the program's category mode and drag ideas into the category box that appears at the bottom of the window. You then drag subtasks into the major task heading. A click on the tool palette lets you see the new tasks in outline view.

After your tasks have been arranged, you can assign dates to them — actual, planned, or any other kind of dates you need. Clicking on the time-series tool takes you to a Gantt-chart view of your dates. If you haven't entered any dates yet, you can enter them in this view, by dragging the bars to the appropriate length.

Fair Witness computerizes the earliest parts of the project-

Glossary

critical path: The critical path through a network includes tasks that affect the entire project schedule if they're lengthened or shortened.

CPM (critical-path method) and PERT (program evaluation-and-review technique): These two methods of project management represent projects as a network of related tasks. As data is entered, a critical path appears that identifies the key tasks in the plan.

Gantt chart: Gantt charts graphically depict the relationship between planned performance and actual performance on time lines. They typically display a single line for planned performance and a second line for actual performance.

management process. It also manages more diverse types of data than any of the other programs do, including graphics, icons, QuickTime movies, and user-specified dates (see Figure 2). Like the Gantt-chart-publishing software, it isn't ideal for complex projects, because critical paths and utilization of resources are not in its repertoire. For projects that require management of data beyond standard dates and resources, however, Fair Witness proves an able assistant.

FastTrack Resource

Gantt charts don't help manage resources — unless you own FastTrack Resource. This innovative product is the first tool to combine the visually communicative Gantt chart with resource histograms (see Figure 3). For quick-and-dirty projects, FastTrack Resource is ideal.

Creating a project plan with FastTrack Resource consists of three steps: defining the tasks, defining the resources, and defining the links between tasks and resources. FastTrack Resource gets you closer to reality than other Gantt packages by helping you understand the availability of your resources.

Resources that are linked to tasks appear as histograms. When a histogram goes to more than 100-percent utilization, there's a problem. One of the best features of FastTrack Resource — a feature that other programs would do well to emulate — is the combined task-and-histogram chart.

The program's customizable reports are excellent and easy to use, but sometimes the user interface misses the mark; for instance, it has you set fonts from a dialog box rather than from a menu. However, as with all AEC Software products, you can recall formats from previously saved files to achieve a more standard look. FastTrack Resource is also the only tool that makes resource management across several projects easy — it's ideal for tracking scarce resources such as silverware, tables, and the like in a catering business, for example.

KeyPlan

Like Fair Witness, KeyPlan also uses an outline metaphor, but it includes a network tool that translates the outline tasks into logical dependencies with resources (see Figure 4). For quick project planning, KeyPlan performs admirably.

KeyPlan projects start as an outline that's almost as good as the Fair Witness whiteboard metaphor but aren't as flexible. From the outline, you switch to the Network view, which displays a floating list of all the headlines designated as tasks or milestones. Dragging a headline from the list turns it into a task box. KeyPlan lets you see only two lines of data and clears them one at a time as you fill them. You can eventually collect all the project data you need, but the program could definitely use a larger data-entry area.

KeyPlan is an excellent planning package. Its intuitive

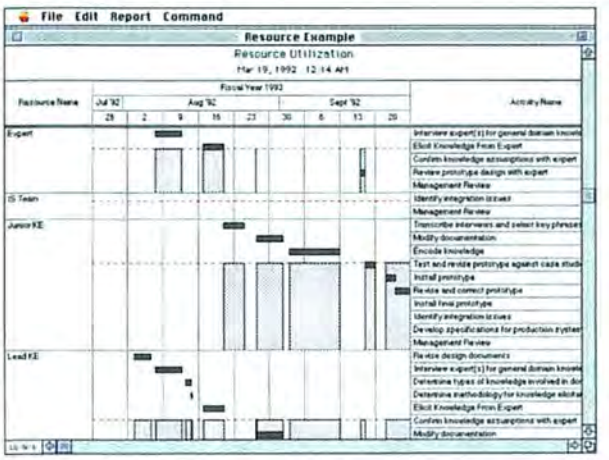

Figure 3: AEC Software offers FastTrack Resource for users who are concerned with resource utilization. FastTrack Resource's compact reports combine a time schedule with resource histograms, so you can easily see if a specific resource is overcommitted at a given time.

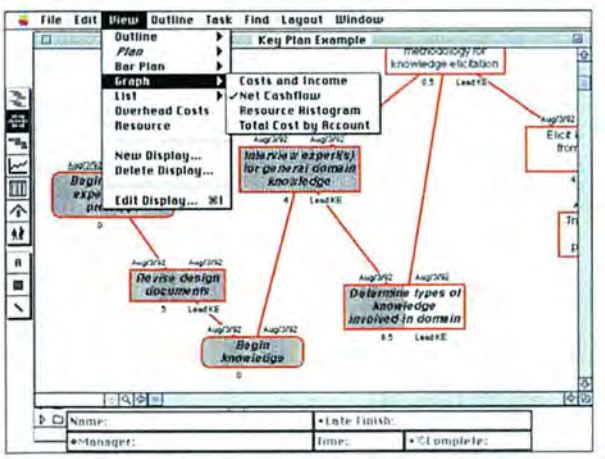

Figure 4: KeyPlan combines outline processing and a network tool that lets you quickly turn your outline into a PERT chart with logical dependencies and resources. Unfortunately, it doesn't support actual data, so you can't compare your plan to reality.

network: A set of tasks that are logically connected and dependent.
resource: A person, group, facility, or piece of equipment that's required to get a particular task done.
resource leveling: As a project develops, project managers attempt to assign the most appropriate resources to a task, which sometimes results in a resource being overcommitted. Resource leveling changes task durations, modifies completion dates, realigns relationships, and/or switches resources to avoid resource overloads.
WBS (work-breakdown structure): A series of codes for distinguishing levels of detail in a work plan.

Gantt Charts: Time on the Line

For many simple projects, all you really need to keep track of things is a time line. In these cases — or when you need a clear way to present a project to your bosses — a Gantt-chart maker may be all you need. FastTrack Schedule (AEC Software), Great Gantt! (Varcon Systems), and MacSchedule (Mainstay) are the key Gantt-charting programs.

FastTrack Schedule 2.0

Like the other Gantt-chart tools, FastTrack Schedule attractively presents other programs' data (imported either as a text file or via the Clipboard). However, it goes beyond straight Gantt graphic displays to include basic start-and-end dependencies among tasks. You can also link tasks, creating simple dependencies among them.

Great Gantt!

Great Gantt! reads text and MacProject II and Micro Planner Manager files. It enhances the plain Gantt views in MacProject II and Micro Planner Manager with fully customizable start/stop symbols, free-form notes, and pasted graphics. When you open a file in Great Gantt!, it immediately becomes a fully customizable view of your project.

MacSchedule/MacSchedule Plus

These two applications add a simple spreadsheet program to the essential Gantt-chart drawing environment. The Plus version can automatically generate earned-value information from your reporting of actual-versus-planned data. Each product can import and export text files.

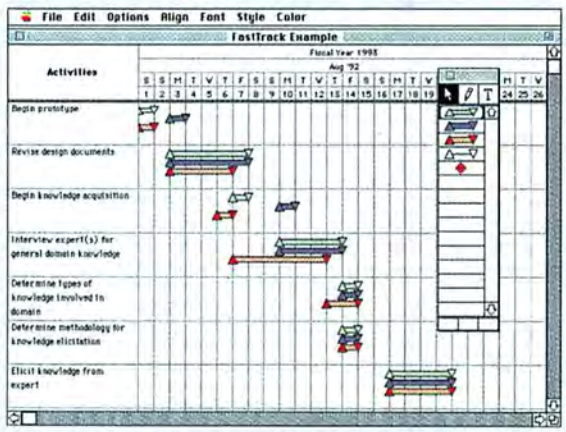

Figure A: FastTrack Schedule can function as a simple scheduler or as a Gantt-chart publisher for programs such as MacProject II. Unlike other Gantt-chart packages, it can create links among tasks.

interface provides easy access to data about costs, resources, and schedules. The future is KeyPlan's main problem: The program doesn't take the future into account, so you can plan but not evaluate.

KeyPlan's crucial flaw is its ignorance of actual data: There's no way to compare what you've done with what you planned to do. If you need only to plan a project and not execute it, KeyPlan is a good choice. Few users, however, have that luxury.

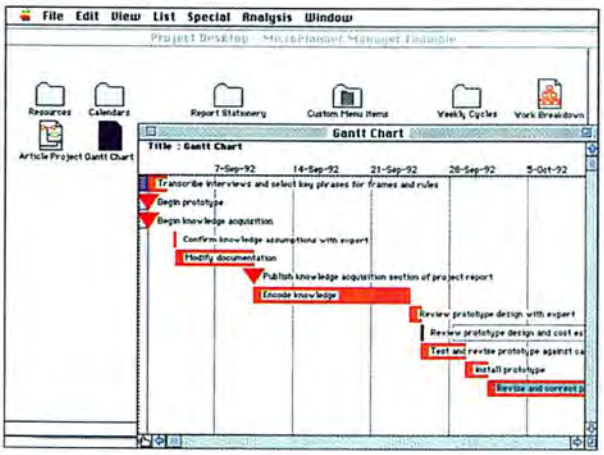

Figure 5: Like its sibling, Micro Planner X-Pert, Micro Planner Manager is designed for users whose primary function is project management. For those who need discipline and constraints, Micro Planner Manager has them.

MacProject II

MacProject II's strength lies in its intuitive interface. Double-clicking on a task reveals a data window — complete with resources, dates, and costs. If you want to concentrate on costs, for example, the other data elements disappear when you click on the costs title.

User interfaces don't manage projects, however. Besides its easy-to-use interface, MacProject II also has a complete set of tools for project management. Gantt charts display time lines by resource or by date, resource histograms display resource utilization, and cost reports keep track of actual versus planned costs. The project spreadsheet lets you do some data customization by hiding columns, for example. Many of these packages provide more-sophisticated reporting and charting features, including full customization, but MacProject II sticks to the essential information.

Apple events provide another unique feature for MacProject II users. The standard MacProject II program does not track earned value (the amount of money actually spent), but it can make this calculation when it's linked to Claris Resolve under System 7. A script executed in Resolve exports appropriate data from MacProject II, loads it, and creates earned-value and other charts from the data.

MacProject II is a solid project manager with ample talents for managing small-to-medium projects. Large files become tedious, because you need to rearrange the task boxes manually, but the ease of data entry and intuitive

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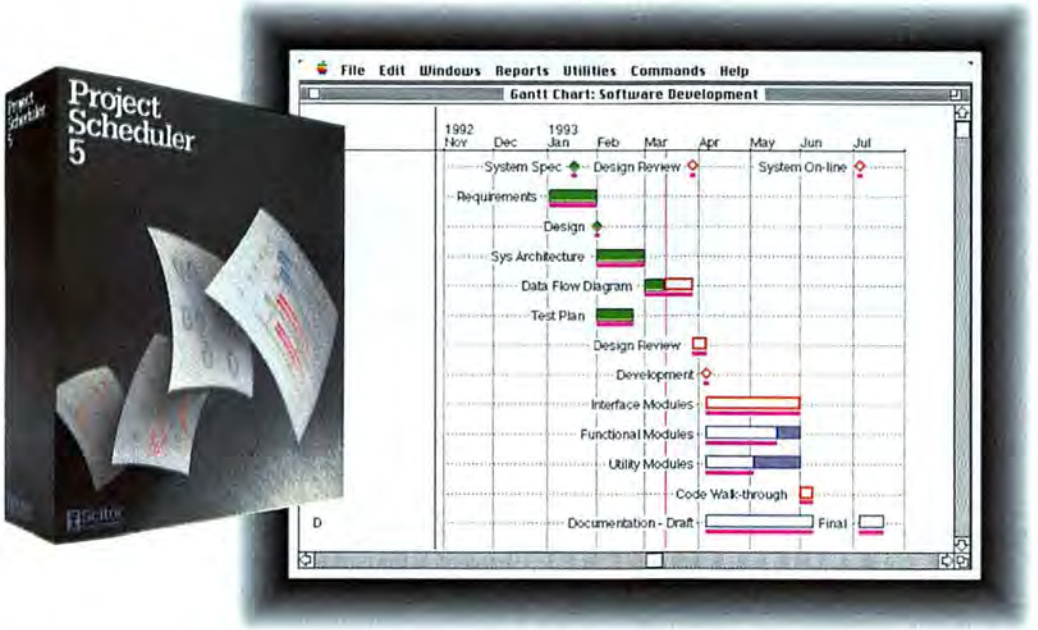

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Future Project: MacProject Pro

By the time you read this, Claris will be shipping MacProject Pro, a complete rewrite of MacProject II. Based on our prerelease copy, here's what you can expect (also see New on the Menu, September '92, page 47).

MacProject Pro retains its predecessor's ease of use but adds several enhancements — the most notable being an integrated outliner — that make it more competitive with high-end tools.

The new outlining feature includes full drag-and-drop ability: You can transfer your brainstormed tasks to the Task Palette for immediate placement on the PERT-network window, where you can then arrange and link the tasks.

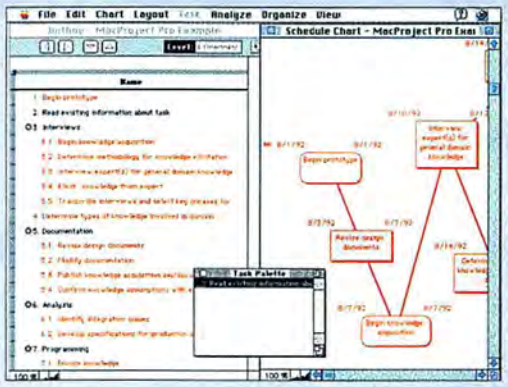

Figure B: MacProject Pro, Claris' rewrite of MacProject II, retains the easy-to-use interface but adds several new features such as outlining and constraints. This figure shows the evolution of a project: A new task from the outline has been transferred to the Task Palette, where it's available for placement in the PERT network.

MacProject Pro also has significantly improved data management. Fully customizable tables and data filters are available, and you can store any number of table-linked data filters in "perspectives," which are similar to Microsoft Project's views. Perspectives remember chart attributes, zoom levels, page setup, headers and footers, and the current sort setting, which makes returning to a specific setup easy.

Other new features include multiple open files, custom attributes, date and cost baselining, free-form notes, new relationships (start-to-start and finish-to-finish besides finish-to-start), cross-project dependencies, headers and footers, custom importing, and full System 7 support.

interface keep the program popular (see the "Future Project: MacProject Pro" sidebar about the forthcoming update of MacProject II).

Micro Planner Manager

Micro Planner Manager is a downsized version of Micro Planner X-Pert, from Micro Planning International. If you really need every feature you can think of and you're on a budget, consider Micro Planner Manager.

Micro Planner Manager uses the same metaphor as the Finder, a desktop (see Figure 5). Resources, projects, calendars, and other related information appear in folders on Micro Planner Manager's desktop. Saved reports also appear there; clicking on a Gantt chart or subproject opens it as if it were a Finder document.

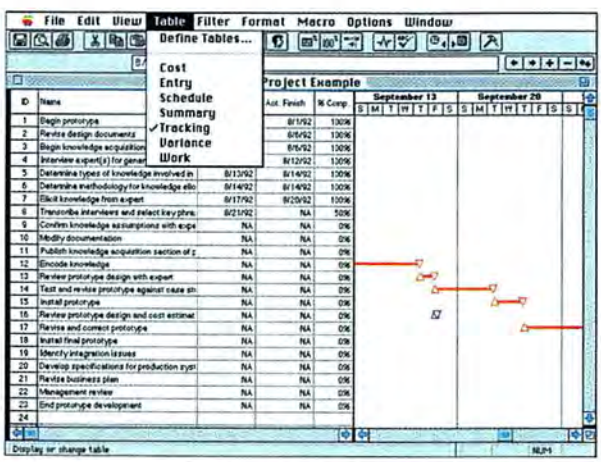

Figure 6: Version 3.0 of Microsoft Project beefs up an already-powerful program. Custom tables and filters make this program a manager's delight, but the vast array of customizing options may intimidate novices.

Micro Planner Manager requires rigorous precision in the way project information is entered, which may frustrate users who just want to get a job done. You can't simply ask the program to display a Gantt chart — your syntax must be precise. For a time-line analysis to work, tasks must be marked with start and end dates along with several other constraints. The product's tedium doesn't encourage brainstorming, but for those who need serious features and a tool that keeps you honest, Micro Planner Manager does just that.

Micro Planner Manager, like Microsoft Project, supports work-breakdown structures. The structure associated with a document, however, resides in a work-breakdown-structure representation that's separate from the project tasks.

The ability to optimize resources by breaking your tasks into smaller chunks is evidence of the program's high-end roots. It incorporates resources from several projects and lets you evaluate them in the light of other projects. MacProject II and Microsoft Project look only at resources in subprojects, and they do little or nothing to reconcile resource conflicts among projects. Micro Planner Manager is also much more strict about data entry than MacProject II or Microsoft Project: Its data-entry validation keeps you from making mistakes.

Micro Planning International, recognizing MacProject II's place in the scheme of things, lets you convert MacProject II files to Micro Planner Manager format.

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The program includes several other unique items, such as a custom report writer and linked Gantt charts that show dependencies. Professional project managers should consider Micro Planner Manager or the more powerful Micro Planner X-Pert.

Microsoft Project

Although it packs a host of high-end features, Microsoft Project can span the spectrum of project managers, from those who only need to generate a Gantt chart to those managing highly complex projects.

Project isn't very flexible in the brainstorming phase of planning, though, because its outliner isn't as full-featured as those in Fair Witness or KeyPlan. Project's outliner lets you create a hierarchy of tasks for work-breakdown structures and summaries, but you can only cut and paste items, not drag and drop them, to rearrange tasks. This is a curious omission indeed, considering that both Word 5.0 and Excel 4.0 offer this function.

What Project lacks in planning, it makes up in execution, however. It supports PERT, Gantt, and table views (see Figure 6). The PERT view lets you create new tasks by dragging and lets you customize how the task boxes, their contents, and the dependency lines look. Task relationships can be specified as finish-to-start, finish-to-finish, start-to-start, and start-to-finish.

Gantt charts can be stand-alone charts, or they can be combined with tables of data. You can change a chart by changing the data in the table, by entering information into a dialog box or form, or simply by dragging. Everything on a Gantt chart can be changed by dragging, including start dates, durations, and percent complete. If you have a small project, you may never need to leave the Gantt view.

If you deal with more-complex projects, however, you'll need to use Project's Table function. Tables, which look like spreadsheets, let you view a task or resource and the factors that affect it, such as an employee and overtime hours, in a simple row-and-column format. Project comes with a wide variety of predefined task and resource tables you can modify. You can also create new tables from scratch. To help make report creation easier — or just to try to stay focused — you can use Project's supplied filters or create custom ones that narrow the displayed data to only those areas you need to view. You can name and save your commonly used filters, and you can associate them with particular tables, creating various "views."

Project 3.0 also includes enhancements that aren't project-management-specific. DDE (dynamic data exchange) is supported for occasions when you need to manipulate your data with another program while maintaining a live link. Publish-and-subscribe is also supported.

Like its siblings Word 5.0 and Excel 4.0, Project lets you modify the user interface. The tool bar contains several default buttons, but it can be customized with user-

Table 1: Pros and Cons of Project-Management Software

	Pros	Cons	Ideal Users
AEC Information Manager	• Custom fields. • Solid underlying database.	• Poorly integrated alarm feature. • No integration with FastTrack Resource.	• Managers who need to track lots of information.
Fair Witness	• Combines excellent brainstorming tools with basic project-management tools. • Supports wide range of data types.	• No network/CPM support. • Complex manual.	• Managers of simple projects. • Creative people.
FastTrack Resource	• Combines Gantt charts with resource management. • Good ad hoc tool for resource management.	• No CPM support. • No integration with AEC Information Manager.	• Project managers who manage more than people.
KeyPlan	• Solid planning tools. • Intuitive interface. • Good reports and graphs.	• Doesn't support actual data.	• Project planners who don't have to track a project.
MacProject II	• Intuitive interface. • Good reports.	• Can't retain custom table formats. • Large projects become unwieldy.	• Traditional project managers.
Micro Planner Manager	• Solid tools for all phases of project plans. • Custom reports.	• Stringent logic requirements take time to grasp and implement.	• Professional project managers.
Microsoft Project	• Highly customizable. • Consistent Microsoft interface.	• Extensive customizing options can be intimidating.	• Users who need to present and track projects.

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defined buttons for macros or commonly used functions.

Other new features include Balloon Help, macros, and an integrated spelling checker that is identical to the one in Excel 4.0, allowing the programs to share dictionaries. Project also supports custom page breaks and undo for drags in the Gantt-chart view, and it has a Fill Down command in tables and a Fit to Page option.

Although Project makes managing simple jobs easy, its plethora of customizing options may intimidate some users. Fortunately, Microsoft provides so many predefined options that you'll probably be able to manage most of your jobs without customizing anything. By the time you do need to create a custom view or table, you'll be familiar enough with the package to do so.

Project contains all the features necessary for most project-management tasks, but as with any sophisticated product, mastering its power takes time.

The Bottom Line

AEC Information Manager and FastTrack Resource are useful tools, but each lacks many features required for major project-management tasks. AEC Information Manager is a valuable day-to-day add-on to MacProject II, and FastTrack Resource's unique Gantt-chart and histogram views make it ideal for managing small projects and for non-human-resource-intensive projects (such as hotel wedding management). AEC would do well to combine the talents of AEC Information Manager, FastTrack Resource, and FastTrack Schedule (see the "Gantt Charts: Time on the Line" sidebar) into one killer product. If it included a CPM calculation and a network view, it would give the other programs a good fight.

Fair Witness falls into a category of its own. Its ability to help with brainstorming, organizing, and tracking makes it a great tool for small projects and projects with minimal time constraints.

KeyPlan's user interface and excellent planning capabilities dim under the shadow of missed opportunity. A few more data elements, such as actual completion, actual start, and actual cost, could make this a recommended program. With so many good project managers available, however, we can't recommend a tool that meets only half of a project manager's needs.

Microsoft Project and Micro Planner Manager provide ample competition for MacProject II. The latter is best suited for hard-core project-management professionals. Microsoft's package holds a slight edge over the current MacProject II, because of Project's integrated outliner and extensive customization options. Traditionalists will probably want to stick with MacProject II, but those looking for more flexibility should consider Project.

Daniel W. Rasmus is an engineer and free-lance author who writes frequently on management, artificial intelligence, and the future of computing.

Table 2: Project-Management Software

	AEC Information Manager	Fair Witness	FastTrack Resource	KeyPlan
	1.22	1.2	1.0	1.07
	‡‡‡	‡‡‡‡	‡‡‡‡	‡‡½
List price	$695	$295	$249	$395
Company	AEC Software, Inc. 22611 Markey Ct. Bldg. 113 Sterling, VA 22170 703-450-1980 703-450-9786 (fax)	Chena Software 905 Harrison St. Allentown, PA 18103 215-770-1210	AEC Software, Inc. 22611 Markey Ct. Bldg. 113 Sterling, VA 22170 703-450-1980 703-450-9786 (fax)	MacVonk USA 313 Iona Ave. Narberth, PA 19072 215-660-0606 215-668-4360 (fax)

	MacProject II	Micro Planner Manager	Microsoft Project
	2.5	1.0	3.0
	‡‡‡½	‡‡‡‡	‡‡‡‡
List price	$499	$695	$695
Company	Claris Corp. 5201 Patrick Henry Dr. Santa Clara, CA 95052 408-727-8227	Micro Planning International 3801 E. Florida Ave. Ste. 605 Denver, CO 80210 303-757-2216 303-757-2047 (fax)	Microsoft Corp. One Microsoft Way Redmond, WA 98052 206-882-8080

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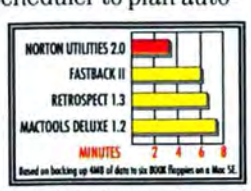

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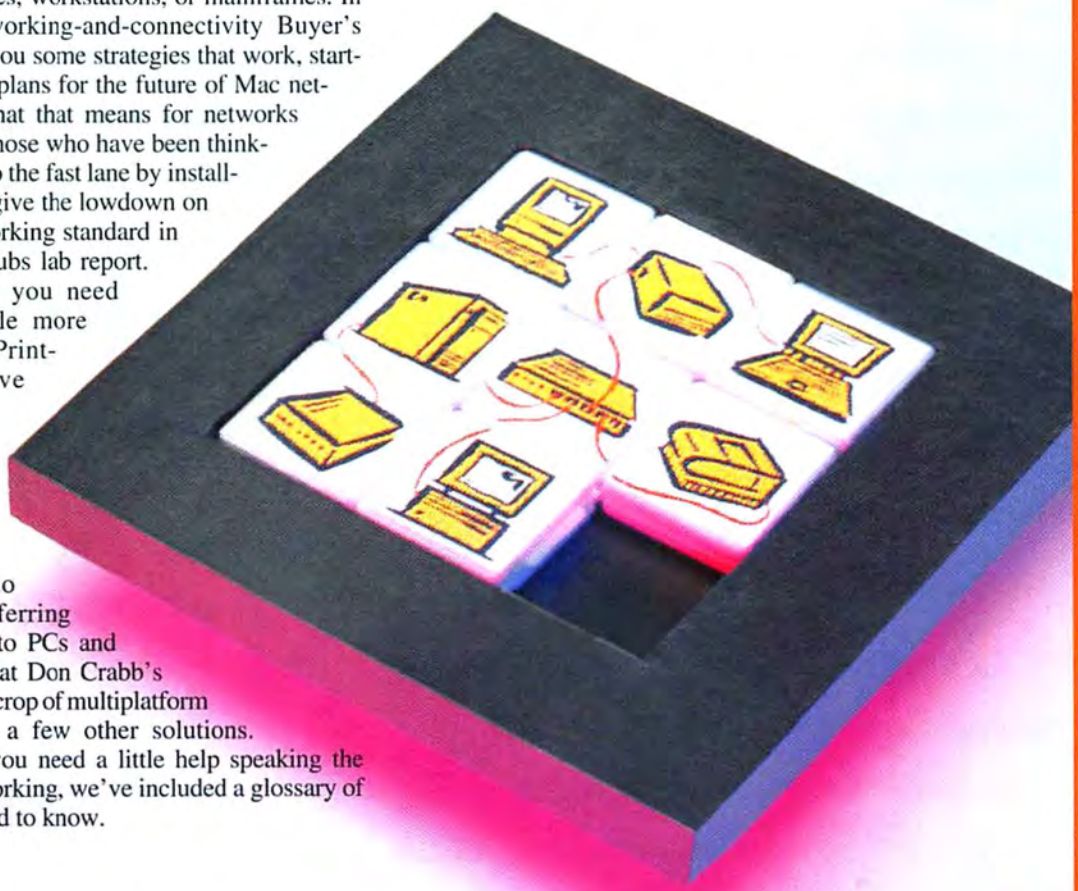
BUYER'S GUIDE

MacUser

Networking and Connectivity:

Network Strategies

The bottom line in the '90s is, if you work with Macs, you need to be able to share information with other machines — whether they're Macs, PCs, VAXes, workstations, or mainframes. In this special networking-and-connectivity Buyer's Guide, we show you some strategies that work, starting with Apple's plans for the future of Mac networks — *and* what that means for networks today. Then, for those who have been thinking of moving into the fast lane by installing Ethernet, we give the lowdown on this speedy networking standard in our 10BASE-T-hubs lab report. To see whether you need something a little more elaborate than PrintMonitor to solve your network-printer bottlenecks, check out the lab report on print servers. And if you're trying to cope with transferring files from Macs to PCs and back again, look at Don Crabb's article on the new crop of multiplatform applications and a few other solutions. Finally, in case you need a little help speaking the language of networking, we've included a glossary of the terms you need to know.



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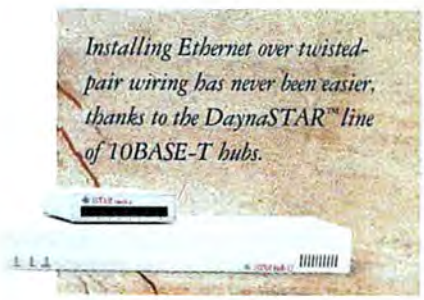
Great Moments

Since the day the Mac was created, Dayna has been inventing remarkable ways to forge Macintosh connectivity links. Computer to computer. People to people. We're known around the world as the company that brought MS-DOS compatibility to the Mac with DaynaFILE™ and DOS Mounter.™ And our encore was to help Novell design Macintosh support for NetWare. That was in the beginning.



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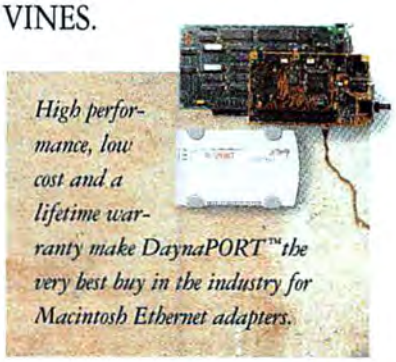

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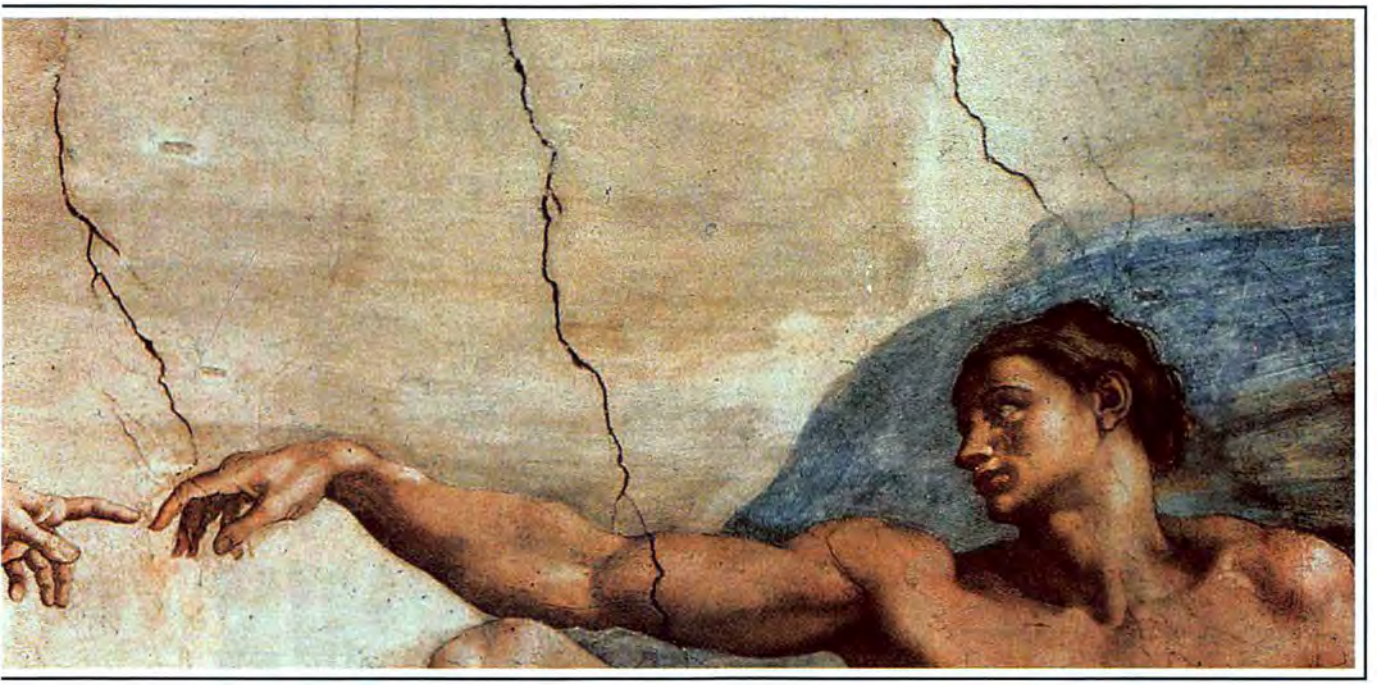

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Network News

The Mac has always been a networking trendsetter, and the best is yet to come. Here's what Apple plans for connectivity and networking on the Mac — and on other platforms.

BY HENRY BORTMAN

Networks have been around for a while (see the "Brief History of Mac Networks" sidebar), but the '90s promises to be the decade in which they become pervasive: We'll be able to get connected to our networks wherever we are, more easily than ever before, and certainly much more quickly.

So where are networks really headed? For starters, they really are getting faster. Although Macintoshes straight out of the box are orders of magnitude more network-capable than comparable stock DOS or Windows machines, the LocalTalk-network hardware built in to Macs is slow. Networks move data, and new capabilities such as sound, full-color graphics, and video use lots of data — much more than LocalTalk is able to handle.

Because LocalTalk can't handle the traffic, people are moving to networks that can — networks such as Ethernet and token ring. The most widely installed high-bandwidth network for Macs is Ethernet, popular in government institutions, large corporations, and universities. Until recently, if you wanted to connect a Mac to Ethernet, you had to buy an add-on interface card. This is still true for most Macs, although Ethernet is now built in to Quadras. And until recently, adding Ethernet capability to your Mac was an expensive proposition: Only two years ago, an Ethernet card could cost you $500 or $600. Now they can be had from companies such as Sonic Systems, Asanté, and Dayna at street prices as low as $150 a pop. "10BASE-T Hubs: Stars on the Ethernet Horizon," elsewhere in this Buyer's Guide, takes a look at 10BASE-T hubs, one of the elements of Ethernet networks you're likely to need if you plan to make the switch from LocalTalk.

If you're looking for even greater bandwidth than this — and companies with extensive networks of users all trying to move large amounts of data are always looking for greater bandwidth — the hot new thing is FDDI (Fiber Distributed Data Interface). FDDI has a bandwidth of 100

ILLUSTRATION: TIM CARROLL

megabits per second, ten times that of Ethernet. It also allows much longer cable runs than Ethernet does, and because it typically runs over optical fiber, which doesn't radiate electromagnetic energy, it's more secure from electronic eavesdropping than copper-wire-based networks are. In August, Codenoll introduced the first FDDI products for Mac IIs and Quadras, with price tags of $4,000 to $6,000 each. Because they cost so much, you're unlikely to rush out and install them in thousands of Macs tomorrow — particularly because you'll likely have to recable your network with optical fiber to take advantage of FDDI — but within a few years, LocalTalk may well be a museum piece, Ethernet the standard, and FDDI down in price to less than $1,000 per node.

Airborne Networking

Another trend in network connections is wireless. Now that Apple has portable Macs — the PowerBooks — *really* light enough to carry around with you, new problems arise — namely, how do you stay connected when you're on the move? One way is through infrared transmission. LocalTalk infrared connections for Macs were available for quite some time from Photonics — its PhotoLink infrared transceivers let you create wireless network connections among groups of Macs hundreds of feet apart. You connected as many as four Macs in each PhotoLink unit, using standard LocalTalk wiring, but the connections *between* transceiver units were made with light waves. Photonics discontinued PhotoLink earlier this year, but that's not the end of the infrared story.

Apple has already said that its forthcoming Newton hand-held computers will have infrared networking capability, which eventually will be even more flexible than PhotoLink ever was (for more on the Newton, see "Newton's World," August '92, page 45). Because each computer will have an infrared transceiver built in to it, a group of users will be able to walk into a room and instantly establish a network connection for exchanging schedule, address-book, and other data. And although neither Photonics nor Apple is talking, the day is probably not far off when similar capabilities will be available for PowerBooks and even for desktop Macs.

Add cellular modems to the up-and-coming list too. Motorola's ARDIS system lets mobile computer users in hundreds of cities and towns throughout the U.S. be both mobile *and* online with their portable computers. With the Mac-compatible system, users pay a fee based on the volume of

For More Information . . .

MacUser aims to keep you informed about changing technology and new products as well as provide solutions for managing your network. The following articles have been selected from our recent coverage:

Network Setup and Management

"Probing for Problems," September '92, page 235 — A review of upgrades to the major packet-analysis programs available.

"Tools of the Trade," February '92, page 233 — A comparison of traffic and protocol analyzers plus a look at some new products designed for router management and network mapping.

"Networking the World," January '92, page 171 — An evaluation of the ways to set up wide-area networks, including a comparison of the cost of each.

"Making the Switch," December '91, page 207 — LocalSwitch is reviewed as a low-cost alternative to Ethernet. We examine printing, file-sharing, upload, and download times.

"Maximum Mac Management," October '91, page 183 — A comparison of four network-management programs, evaluating such features as database management, data analysis, and speed.

"Instant Ethernet: 10BASE-T," September '91, page 174 — A look at 29 ways to enhance your network's speed and performance with 10BASE-T.

"Mac, DOS, and VAX File Servers," June '91, page 134 — An examination of eight file-server software-and-hardware systems. Also included are suggestions for optimizing server performance and a description of how file servers work.

"Fast, Full-Featured Fax Modems," May '91, page 104 — A review of six high-speed fax modems. Also presented are warranty terms and conditions.

"Building a Better Network with EtherTalk-to-LocalTalk Routers," April '91, page 156 — An evaluation of six hardware routers and two software routers. Also included are a network glossary and an illustration of a typical internet.

Connectivity

"VITAL Points the Way," August '92, page 201 — An introduction to VITAL, Apple's model for creating data-sharing applications on multiplatform networks.

"Opening the X Window," June '92, page 205 — The differences between the Mac world and the X world and a few suggestions on linking the two.

"Parlez-Vous UNIX?" May '92, page 195 — Three alternatives for getting your Mac to communicate with a UNIX machine.

"The Global Network: E-Mail Gateways," April '92, page 142 — A look at two E-mail gateways for a global network. Also included are a directory of gateway products and a diagram of how E-mail gateways work.

"Dialing for Data," April '92, page 187 — How to communicate with your Mac from a distance. Security features are also discussed.

"On Beyond E-Mail," March '92, page 191 — Our first peek at Apple's Open Collaboration Environment (OCE) and how it will help you.

"The Client/Server Revolution," November '91, page 185 — The advantages and costs of mainframe, client/server, and file-server-based databases.

"The Mac-to-Mini Connection," May '91, page 213 — An evaluation of the different ways of connecting Macs to IBM minicomputers, including reviews of the converters and boards needed for making this connection.

— Amanda B. Michael

usage and the services accessed.

As cellular data-modem technologies advance, the distinction between telecommunications and networking will blur. Networking will no longer imply physical cable connections, and telecommunications will no longer imply limited data-access capabilities.

And Now a Message

Unfortunately, one of the most common network services, electronic mail, hasn't yet found its way into the Mac's operating system. Although there are several strong alternatives for E-mail on the Mac — CE Software's QuickMail, Microsoft Mail, and cc:Mail's cc:Mail — the absence of E-mail capability in the Mac OS has limited the extent of E-mail's use.

That's about to change. Some time in the first half of 1993 (if things go according to plan), Apple will release its Open Collaboration Environment (OCE) as an extension to System 7 (for more on OCE, see "On Beyond E-Mail," March '92, page 191). OCE will have several components. The most popular services will undoubtedly be its directory and messaging capabilities. Users of Macs with OCE installed in their system will have two new icons on their desktops: a directory and a mailbox.

The directory will provide an alternative to the Chooser for accessing networked printers, fax modems, and file servers. Apple will provide a simple letter application that will let users address simple text messages, with the option of enclosing files, to other users simply by selecting their names from the directory. If the recipients are Mac users who also have OCE installed, the messages will show up in a mailbox on their machines.

But you won't be restricted to sending messages to or receiving them from other OCE users. OCE will also be able to route messages to non-OCE users on the same network, to users of other types of computer mail systems on remote networks, and even to destinations on on-line services such as CompuServe and MCI Mail. OCE will know when it needs to make a phone call to connect to a remote message system in order to get your mail delivered. If the intended recipient's machine is not available when you send the message, your Mac will know to keep trying until it can get through or to send the message to a third or fourth machine that can store the message temporarily until it can forward it to its final destination.

This may seem like a lot of power for simple mail messages. But OCE won't be limited to sending messages from Apple's basic letter application. Third-party developers that implement support for OCE — and most software vendors will probably elect to support it — will let users send documents to other users directly from within those applications. You'll be able to send any open document as a message, as easily as picking Send from the File menu. You'll be able to send forms, graphics, and even voice mail this way. And it will all show up in a single mailbox on the desktop. OCE may well make the routing of electronic documents as easy as the routing of paper documents is today and may help usher in the paperless office.

OCE will provide security features

A Brief History of Mac Networks

The Mac's built-in networking capabilities have come a long way in the past eight years. Here are the highlights:

1984 — the printer port. It was actually a LocalTalk interface. Unfortunately, there weren't any networkable printers — or networkable anything else.

1985 — the LaserWriter. The LaserWriter was remarkable because it was a (relatively) inexpensive high-resolution printer capable of producing near-typeset-quality type and attractive graphics *and* it had a built-in LocalTalk interface. So merely by stringing together a few inexpensive wires and connectors, you could share the printer among several Mac users.

Groups of Macs sharing LaserWriters comprised the first AppleTalk networks. To select a printer, all users had to do was go to the Chooser, click on the LaserWriter icon, and then click on the name of a printer. This was unheard of — no networking system had ever before provided the ability to select a printer by name.

1987 — AppleShare. Apple's Mac-based file-server software made the sharing of files as easy as LaserWriters made the sharing of printers. Files saved on drives attached to a file-server Mac could be accessed by multiple users on an AppleTalk network through the Chooser. Once the volumes had been mounted, users could open, copy, save, and delete files on shared volumes by pointing and clicking, although access to folders on shared volumes could be limited to authorized users with the proper password.

AppleShare support in the form of AFP (AppleTalk Filing Protocol) has become a standard option for all the most popular network operating systems. This has made it possible for Mac users to easily access files on PCs via Novell NetWare, Banyan VINES, and Microsoft LAN Manager Server for the Macintosh; on Digital's VAXes via PathWorks, AlisaShare, and PacerShare; and on a variety of UNIX platforms via IPT's uShare or gateways such as Cayman's GatorShare.

1991 — File Sharing. System 7 brought distributed AFP file serving to users' desktops. Users still clicked on the AppleShare icon in the Chooser to mount a shared volume from another user's computer, but now all users could turn their Mac into a mini file server. Don't try this with Windows.

1991 — AppleTalk Remote Access (ARA). Bundled with PowerBooks and sold separately to desktop-machine users, ARA provided users with a simple and standard way to dial in to an AppleTalk network and access its printer, file, mail, and other shared services.

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CIRCLE 224 ON READER SERVICE CARD.

that third-party software developers will be able to incorporate into their products. Digital signatures will let you verify the sender and the integrity of the contents of documents. Using a private encryption key, you'll be able to send a document to another user who, using the public decryption key you've provided, will be able to verify that you're the sender of the document and that its contents have not been intentionally tampered with or inadvertently altered during transmission. These authentication services and what Apple calls document "privacy" will make it possible to send documents whose contents are encrypted as well.

Crossing Platforms

One interesting aspect of OCE is that Apple is seriously considering licensing it for incorporation into or as extensions to non-Mac operating systems. After years of keeping its operating-system technology proprietary, Apple is beginning to see the possibility of gaining market share not necessarily by selling only Macs but rather by selling system-software technology as well. It's not difficult to imagine that OCE will be more effective if it is available on PCs and UNIX workstations than if it remains within the sole domain of Macs.

This is but one type of cross-platform cooperation. Apple recently (finally!) released Macintosh PC Exchange, software that lets users insert a DOS-formatted 3.5-inch disk into a Mac floppy drive and have an icon representing the disk appear on the Mac desktop. Apple has also announced plans for a standard document format and for a Translation Manager as part of a future operating system. The Translation Manager will automatically translate the contents of a file created by another user with an application you don't own into a format that can be read by an application you do own.

Several products that perform a similar function, such as DataViz's MacLinkPlus, are available today. And quite a few applications, such as Word, WordPerfect, Excel, Lotus 1-2-3, and PageMaker, offer file-contents formats that can go back and forth between Macintosh and Windows platforms, causing users only minor problems (for more on cross-platform applications, see "Double Features: Working with Macs and PCs," elsewhere in this Buyer's Guide). Apple has even announced that it will soon offer a software-development environment capable of producing Macintosh and Windows applications.

These capabilities may seem a bit far afield in a discussion of networking, but it is precisely the proliferation of networked computers, in particular the increase in the number of sites at which Macs and PCs coexist on the same networks, that is driving software developers to address cross-platform-compatibility issues. As data-communications connectivity becomes pervasive, users, regardless of their physical location, will need to think less and less about how they are connected and will be able to think more about the data they are communicating. Networks are merely a means to an end, and that end is the dissemination of information. Tomorrow's networks will be heterogeneous: As Apple has realized, the Mac's continued success will depend largely on how successfully — and how easily — it can integrate and interoperate with other computers.

Henry Bortman is *MacUser*'s technical director.

How to Network

How do you stay completely informed about every aspect of networking? The best source is smart friends — the fastest and most thorough way of learning about networking. You can start by inquiring at local user groups to see if they have networking special-interest groups. To find the Mac user group nearest you, call Apple's toll-free hot line at 800-538-9696, extension 500, or check with your local Apple dealer.

If you don't know any networking experts in your area, go on-line. For those who have access to the Internet (the worldwide TCP/IP-based internetwork), the "newsgroup" comp.protocols.appletalk is an excellent forum to look in for answers to Mac networking questions. On CompuServe, the Macintosh Communications Forum — a.k.a. MacComm — also has a lively networking section. The AppleTalk Network Managers Association (ANMA on America Online or anma@aol.com on the Internet) is rapidly expanding throughout the U.S.

If you'd prefer to read up on networking, start with the AppleTalk-networking books from Addison-Wesley (617-944-3700). The series spans a range of complexity, from *Understanding Computer Networks*, which is aimed at beginners, to *Planning and Managing Computer Networks* and *Inside AppleTalk*, second edition, for anyone who needs detailed knowledge of all the AppleTalk protocols.

The only Mac-specific networking magazine is *Connections*, published by Winehouse Computing (800-798-2928 or 408-354-2500). You should also read the Gateways section of *MacWEEK* magazine (609-461-2100). For information about non-AppleTalk networking, try *Communications Week* (516-562-5000) or *Network World* (508-620-7760).

Mactivity, the annual Macintosh connectivity conference, is well worth attending, both for the sessions and to meet lots of networking professionals. Now heading into its third year, Mactivity is conducted by Winehouse Computing (800-798-2928 or 408-354-2500).

— Stephan Somogyi

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Double Features:

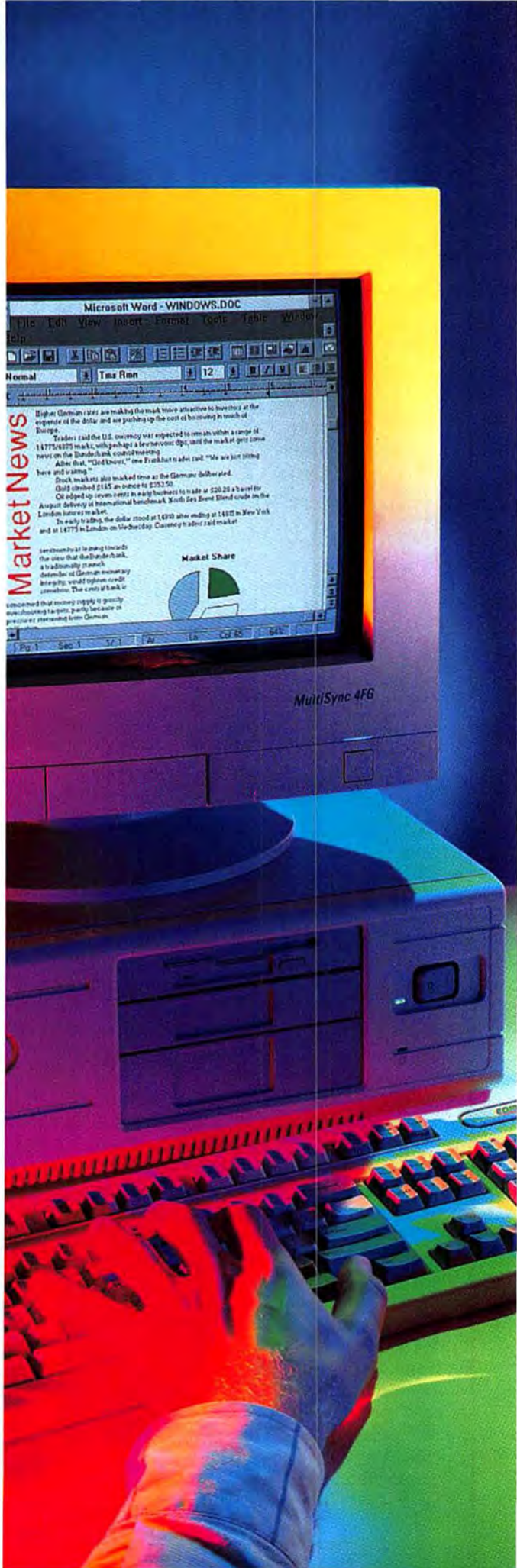
Working with Macs and PCs

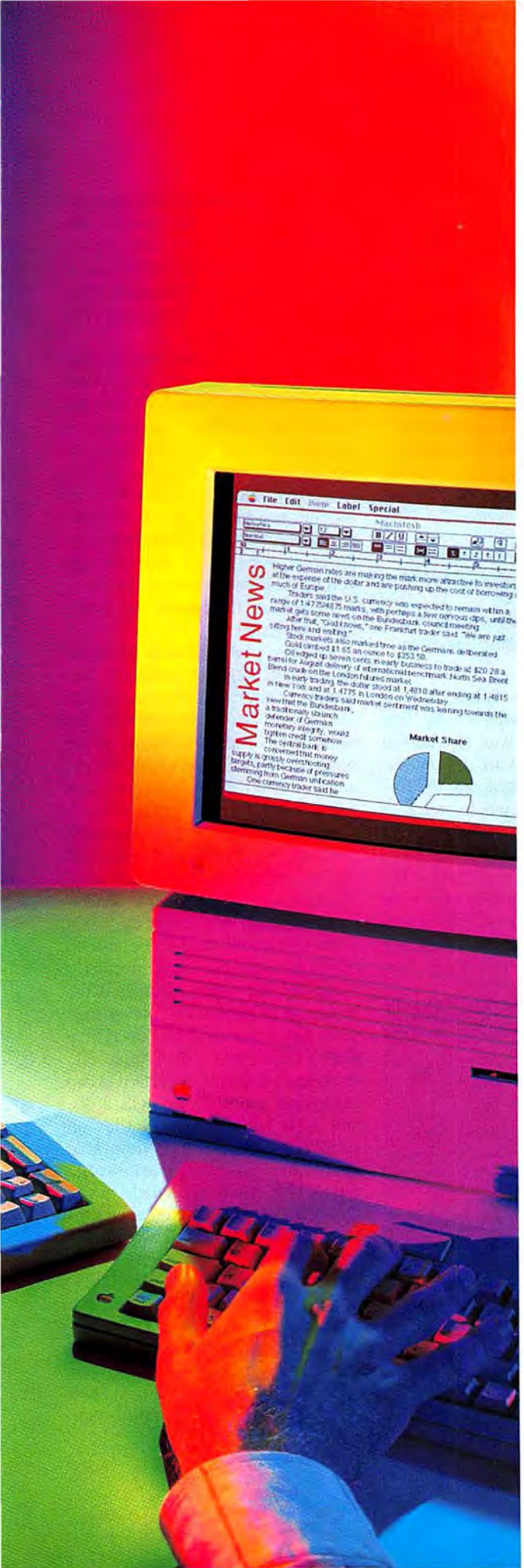
With Macs and PCs side by side in the same office, how can users get work done without worrying about which computer they're using? Here are three key strategies for trouble-free sharing of files and applications.

BY DON CRABB

In a perfect world, we'd never have to worry about computing compatibility — all computers would run all applications and read all data files. Sadly, we are far from such a computing nirvana today. Instead, Mac users who want to thrive in an environment that includes PCs running DOS and Windows must learn to deal with interoperability issues.

For my part, I use and manage a heterogeneous network that consists of a LAN (local-area network) backbone running Ethernet, TCP/IP, DECNet, EtherTalk, and related protocols; that whole network connects to networks in adjacent buildings. Plugged in to this network are Macintoshes, PCs, and UNIX workstations as well as bigger iron. Like anyone working with this sort of network, I've spent plenty of time trying to share documents easily among Macs, PCs running DOS, and PCs running Windows.





There are several ways to achieve more-or-less transparent file sharing; I'm going to focus on the three I trust most: multiplatform applications, file-format-translation software, and running DOS on Macs.

Goal: You want to limit the number of applications that create files on your network, streamline training and tech support, and make sure you can interchange files across the network with minimal loss of data and format changes.

Strategy: Invest in multiplatform applications.

A multiplatform application is a program that has separate versions that run under different operating systems. For this discussion, that means applications that come in versions for the Mac, for PCs running DOS, and for PCs running Windows. Some applications — WordPerfect, for example — also come in versions for platforms such as UNIX machines and Sun workstations. No vendor yet sells software that automatically configures itself to run on whatever operating system it finds, although you can expect this capability sometime this decade. Adobe, Aldus, Claris, Corel Systems, DeltaPoint, Lotus, Macromedia, Microsoft, Quark, Symantec, WordPerfect, and others have either already released multiplatform products or are planning to do so soon.

Theoretically, the beauty of multiplatform applications is that they use the same file type for different platforms. So if your LAN includes Macs as well as PCs and you need to exchange word-processing, spreadsheet, database, or graphics files without losing data or formatting, you'll be able to do so by running the same application on all platforms. Both the Windows and Mac versions of Excel, for example, use exactly the same core code, which Microsoft has simply optimized for each platform. The only differences are those that arise because of the operating systems' differences.

In the real world, however, some multiplatform applications still create different file types that don't exactly match across platforms, even though they sometimes have the same file-type name. Lotus 1-2-3, for example, uses different file formats for its Mac and Windows versions, although you can save documents created in one version in the format used by the other version.

What's more, features found on one platform's version may not be found on another. For example, the Windows version of WordPerfect can create tables, but the Mac

PHOTOGRAPHY: ROSEMARY WILTON

version can't; some graphics formats in the PC version of PageMaker can't be translated by the Mac; and Lotus 1-2-3 for Windows has a multivariable solver capability, but the Mac version has only a single-variable capability.

In other words, although multiplatform applications can sometimes offer the easiest way to exchange files, you may have to experiment to learn how best to retain most of your documents' essential elements (see Figure 1). Check your application's documentation to see if it offers guidelines for exchanging files among platforms. Microsoft Word, for example, includes an extremely helpful file (look for convinfo.doc in the Windows version, Conversion Information in the Mac version) that explains which elements don't translate from one platform to another. Unfortunately, this valuable document — which can save a lot of headaches — goes virtually unnoticed by a lot of users.

Multiplatform applications offer the advantage of easier training and tech support. If you choose one program (such as Microsoft Word) for each type of task (such as word processing), you may be able to reduce training time, because you're essentially offering the same software to Mac and PC users. This is especially true for Mac and Windows products: Due to similarities in the Mac's Finder and Windows' graphical user interface, multiplatform applications running in these environments not only share files easily but they also tend to look and work similarly.

Despite their advantages, multiplatform applications aren't always the best choice. If all you want is easy data exchange, switching to a multiplatform application may mean giving up important features or abilities. To make sure you get the features you're looking for, see the "Buying the Best" sidebar.

Goal: You want to exchange files, using the applications you already have.
Strategy: Standardize file formats and use file-translation software.

You don't have to replace all your software just to get multiplatform flexibility. Instead, you can standardize your file formats and use file-translation software. Standardizing the format for the files you will interchange over your network is most practical when you don't have a lot of people using many different applications. For example, you might pick Word as your word-processing format, ASCII tab-delimited as your database format, and WKS for spreadsheets. When you standardize the data-interchange file types, you reduce the need for file translation. Make sure everyone on your network saves shared files in an acceptable format. (Standardizing file types is a good idea even on LANs that have only Macs.)

The biggest problem with the file-standardization approach is that even when two applications are using the "same" file type, there is no guarantee that the file type is really identical. Because no standardization committees force vendors to create identical formats, you can end up with compatibility problems. You should test the different versions of any software you're interested in before you buy it, to make sure the formats are really interchangeable.

Another problem with trying to standardize your file formats is file-format proliferation. Dozens of formats are available on the Mac and even more on the PC. Some of the spreadsheet formats available, for example, are WKS, originated in Lotus 1-2-3; WK1, originated in Lotus 1-2-3 and Quattro Pro; SYLK, originated in Multiplan, Quattro, and Excel; and DIF, originated in several programs. Even if you've decided that all spreadsheet files will be saved in the WKS format, you still need to be able to read files created in another format.

Apple successfully addressed the basics of DOS/Mac file interchange several years ago with its SuperDrive floppy drives and AFE (Apple File Exchange) software. SuperDrives can read from and write to DOS disks, and AFE lets you access files on DOS disks and use them from Mac applications that can handle those file types. AFE's built-in strengths are its DCA/RFT (Document Content Architecture/Revisable Form Text) translators and its XTND translators, which let software developers build file-access routines into their software so it can read and write multiple file formats without intermediate translation steps.

If you want to actually mount DOS disks on your desktop rather than

Buying the Best

Just because an application is available for different platforms doesn't necessarily mean that file exchange among those platforms will be trouble-free. Here are some buying guidelines to consider when you're in the market for multiplatform applications:

- Look for products that use the same file format. Not having to use the Save As command makes file exchange a lot easier.
- Choose products that have standardized key commands, menu choices, and so on across platforms, where applicable. Lotus 1-2-3, for example, includes a Classic menu, which lets Mac and Windows users who are more familiar with the DOS version of Lotus access a menu of DOS commands by pressing the slash key.
- Before you buy, make sure that frequently used functions are available in all versions.
- Test the applications you're interested in on your network. See how easy it is for users to share typical files and whether all data is retained. You'll probably have to do some minor tweaking to keep formats identical.
- Check to see if the publisher's tech-support service offers troubleshooting assistance for file sharing.
- Because different operating systems treat technologies such as sound, graphics, fonts, and color differently, the application you buy should be able to reconcile these differences so that you don't have to. Some things that look good on the Mac (line wraps, for example) look bad on Windows.

Figure 1: Easy Crossing

No matter how well designed a cross-platform application is, documents are not going to translate from Mac to PC and back again and still look identical — without a lot of fussing on your part, that is. The more sophisticated your document, the more likely it is you'll have to tweak elements such as headers, footers, tables, and line spacing to keep the Mac and the PC versions looking the same. Here are some things you may have to watch for if you translate between Microsoft Word for the Mac and for Windows. For more information, see *Marianne Carroll's Super Desktop Documents* (New York: Brady, 1992).

Fonts
One of the biggest problems with converting a Word document from one platform to another is that each platform uses different printer fonts (Geneva on the Mac is called Arial on the PC, Courier on the Mac is called Courier New on the PC, and so on). You can ease the conversion by creating a font-mapping file, which tells the printer which fonts to substitute for which (the fonts won't necessarily match each other, however). This isn't hard to do: A template is included in the File Conversion file, which you can find in the Word 5 folder.

Fractional Widths
Because kerning in Word is slightly different in the Mac and Windows versions, the only way to preserve line breaks and pagination when you convert a Mac document to Windows is to turn off fractional widths (choose Page Setup from the File menu) on the Mac. Note, however, that when you print from the Mac with fractional widths turned off, you may sacrifice correct spacing in headers and footers that include text and automatic page numbering.

Rotated Text
Rotated text created on the Mac is converted into a bit-mapped graphic in Windows, so you can no longer edit the text.

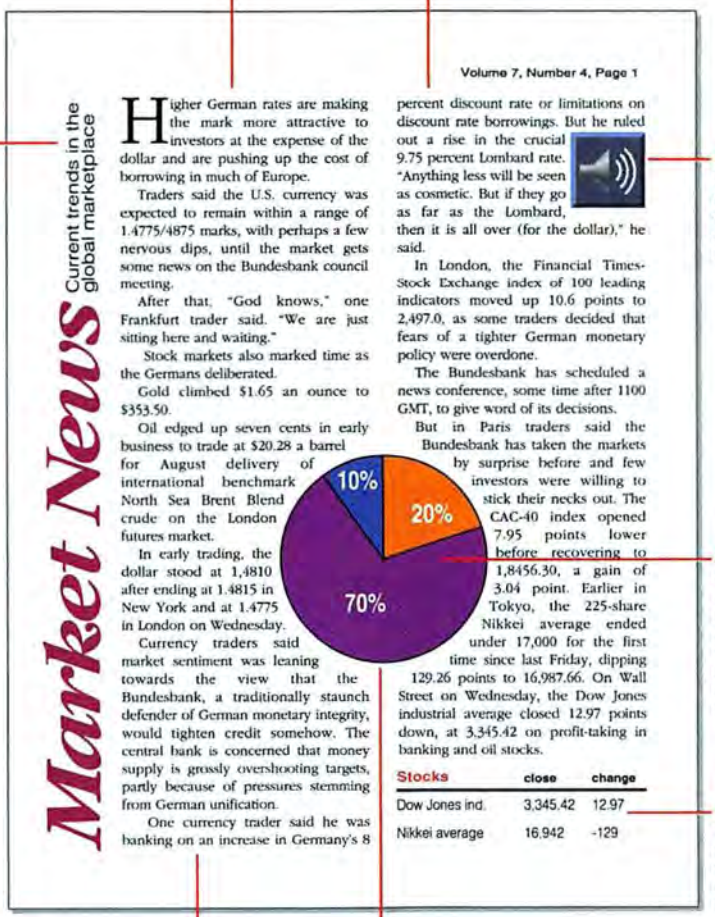
Sound Annotations
If you add sound notes to your Word 5 document on the Mac, all you'll get on the Windows side is a bit-mapped speaker icon.

Colors
Color mapping is not identical between the two platforms. As a result, if you're converting a Windows document into one that can be read by the Mac, dark colors may translate as black.

Vertical-Line Tabs
These tabs — which some people use in the ruler to create tables — don't convert to Windows from the Mac version of Word.

Line Spacing
The Auto setting for line spacing (choose Paragraph from the Format menu) is slightly different in the Mac and Windows versions of Word. To avoid problems, don't use the Auto setting; instead, use a point size that is approximately 20 percent larger than the font size.

Object Linking and Embedding
If you *embed* a spreadsheet or graph in a Word document on the Mac, it will be translated into Windows intact. However, if you *link* a spreadsheet or chart to the document, when you port the information to Windows, you'll have to reestablish the link so that the data is updated correctly.



Volume 7, Number 4, Page 1

Market News
Current trends in the global marketplace

Higher German rates are making the mark more attractive to investors at the expense of the dollar and are pushing up the cost of borrowing in much of Europe.

Traders said the U.S. currency was expected to remain within a range of 1.4775/4875 marks, with perhaps a few nervous dips, until the market gets some news on the Bundesbank council meeting.

After that, "God knows," one Frankfurt trader said. "We are just sitting here and waiting."

Stock markets also marked time as the Germans deliberated.

Gold climbed $1.65 an ounce to $353.50.

Oil edged up seven cents in early business to trade at $20.28 a barrel for August delivery of international benchmark North Sea Brent Blend crude on the London futures market.

In early trading, the dollar stood at 1.4810 after ending at 1.4815 in New York and at 1.4775 in London on Wednesday.

Currency traders said market sentiment was leaning towards the view that the Bundesbank, a traditionally staunch defender of German monetary integrity, would tighten credit somehow. The central bank is concerned that money supply is grossly overshooting targets, partly because of pressures stemming from German unification.

One currency trader said he was banking on an increase in Germany's 8 percent discount rate or limitations on discount rate borrowings. But he ruled out a rise in the crucial 9.75 percent Lombard rate. "Anything less will be seen as cosmetic. But if they go as far as the Lombard, then it is all over (for the dollar)," he said.

In London, the Financial Times-Stock Exchange index of 100 leading indicators moved up 10.6 points to 2,497.0, as some traders decided that fears of a tighter German monetary policy were overdone.

The Bundesbank has scheduled a news conference, some time after 1100 GMT, to give word of its decisions.

But in Paris traders said the Bundesbank has taken the markets by surprise before and few investors were willing to stick their necks out. The CAC-40 index opened 7.95 points lower before recovering to 1,8456.30, a gain of 3.04 point. Earlier in Tokyo, the 225-share Nikkei average ended under 17,000 for the first time since last Friday, dipping 129.26 points to 16,987.66. On Wall Street on Wednesday, the Dow Jones industrial average closed 12.97 points down, at 3,345.42 on profit-taking in banking and oil stocks.

Stocks	close	change
Dow Jones ind.	3,345.42	12.97
Nikkei average	16,942	-129

going through the unintuitive AFE dialog box, you can use Insignia's AccessPC, Apple's Macintosh PC Exchange, or Dayna's DOS Mounter.

Some Mac applications include the XTND translation technology. A greater variety of file translators is available in products such as Software Bridge/Mac ($159), from Argosy, which can translate more than 30 Mac and PC word-processing programs and includes MountPC for mounting DOS disks on Macs; MacLinkPlus ($169), from DataViz, which contains more than 400 word-processing, spreadsheet, database, and graphics translators as well as Dayna's DOS Mounter software; and LapLink Mac ($149.95), from Traveling Software, which includes 13 word-processing translators from Mastersoft.

Another problem with file-format translation is that you can lose data and formatting. The more complex the translation, the more likely this is to occur. You're likely to lose such elements as headers and footers, embedded graphics, and special features such as outlining and paragraph numbering. To see just what, if anything, has been lost, you need to compare the original file in the original software to the translated file opened by the new software. Word-processing files usually translate most cleanly, and database files come in second. Spreadsheet files are trickier, especially if they contain macros or complex formulas.

Goal: You want to easily access data created with a PC application that doesn't exist for the Macintosh.
Strategy: Run DOS on your Mac.

You have three options for running DOS in a window on your Mac: using Argosy's RunPC, which connects a PC to your Mac and gives you a DOS window; using Insignia's SoftPC or SoftAT, which offer true software emulation of DOS running directly on your Macintosh; or adding a NuBus DOS 386 coprocessor board, such as those available from Orange Micro for around $2,000.

SoftPC and SoftAT are easy to use and inexpensive, but they're too slow to be practical for running Windows. Argosy's RunPC is inexpensive too, and it can operate on a network. Although faster than SoftPC, RunPC is also too slow to run Windows well. If you want speed and the ability to run Windows on your Mac, the Orange Micro board is the only real solution, but it's much more expensive than the other choices.

Multiplatform Applications: Where to Get Them

Adobe Systems, Inc.
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XTND and Other Trends

Apple promises to make file-translation more transparent as it moves to incorporate XTND technology, which it acquired from Claris, into system software. Apple's developers' kit is expected to be an enhanced version of Claris'.

Apple is trying to make it easier for developers to create their software for the Macintosh and for Windows simultaneously. It's working on a new multiplatform application-development language called Dylan, which will work on the Mac, UNIX workstations, PCs (DOS and Windows), and Apple's new Newton personal digital assistants.

Dylan (derived from the phrase *dynamic language*) is the result of a joint project of the Massachusetts Institute of Technology and Apple's Advanced Technology Group, which are both located in Cambridge, Massachusetts. It is a descendant of the language LISP. Dylan provides functions similar to those of Windows' Dynamic Link Libraries, which load objects into a PC's memory as applications require them. It can streamline development, because one module can serve several programs.

In addition to developing Dylan, Apple has recently announced that it and Symantec will jointly develop a multiplatform development framework that will include Apple's MacApp technology. This framework will be based on Symantec's Bedrock, a forthcoming multiplatform development environment that works on the Mac and with Windows and will later also support UNIX and OS/2.

Despite advances in multiplatform file sharing, you will face problems, especially if you are using cutting-edge technology. What happens, for example, when Macs and PCs need to share QuickTime movies, sound files, and 24-bit animations? Currently, you have to go through a fair number of gyrations to make it work. Apple promises to help fix this; it has announced a version of QuickTime for Windows due "real soon now."

Look for an increased number of multiplatform applications in the near future. And before too long, expect to see software vendors selling kernels that can be used to develop applications for any kind of machine. On top of these kernels will be interface elements designed for particular operating systems.

Contributing editor Don Crabb teaches computer science at the University of Chicago and moonlights as the producer and host of the syndicated television show "MacTV."

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ILLUSTRATION: TIM CARROLL

Policing the Print Queue

Three network print-server applications claim that they can bail you out of printing delays and printer-management hassles — but are they worth the money?

BY JOHN RIZZO

Waiting for a PostScript printer to receive your document can seem interminable, particularly if the document is large and complex. That's why many of us breathed a collective sigh of relief when Apple started shipping a print spooler, PrintMonitor, with System 6. PrintMonitor returns control of your Mac's cursor while sending the print job to the printer in the background. At the same time, Apple started selling print-server applications (soon offered by third-party vendors as well), which completely remove the spooling task from the Mac. At this point, an obvious question arises: Why should you pay for a print server when PrintMonitor costs nothing?

For one thing, PrintMonitor isn't ideal when many users share one printer. As a one-Mac-to-one-printer solution, PrintMonitor can't do anything about a printer's inability to accept more than one print job at a time. In addition, there are a few programs — most notably PageMaker — that have historically had compatibility problems with PrintMonitor.

When a print-server application is running on a centralized computer on a network, all print jobs go to the server before being passed on to a printer. Print servers give you a list of queued print jobs and the option of canceling a pending job or redirecting the job to another printer. You can also tell a print server to print a *banner page* after every document showing information about the job. In addition, print servers can help you manage your printers by providing detailed information on their use.

The best-known print-server software is Apple's AppleShare Print Server 3.0, which comes as part of AppleShare Server 3.0 (see "Full-Featured File Service: AppleShare Server 3.0," April '92, page 150). We compared AppleShare Print Server with the other two currently available AppleTalk print-server applications: Print Central 2.4, from Compumation, and PServe 3.0, from COPS (CoOperative Printing Solutions). PServe 3.0 runs on a PC. These products represent diverse approaches to print serving — none of which turns out to be perfect in itself.

Spooling Revealed

The term *spooling* has nothing to do with unwinding something thread-like from a cylinder; it's actually an acronym for *simultaneous print operations on-line* — a high-tech way of saying that you can request one or more documents to be printed without having to wait for each one to be sent to the printer before you regain control of your Mac. PrintMonitor, like third-party local spoolers, stores print jobs on your Mac, feeding them to a printer when it's available. If someone else's document is printing, the spooler waits. You have no way of knowing if a printer is already busy or whether the user before you is printing a 1-page or a 101-page document. The spooling occurs in the background, enabling you to use your Mac for another application — but like any background task on the Mac, it can affect the performance of the foreground application.

With print servers, spooling occurs on the server computer, not on the user's Mac (see the "How It Works" sidebar). A print server collects print jobs from multiple users on a network and compiles a list of jobs called a print queue.

You select a print server the same way you select a printer in the Chooser. You can also use PrintMonitor with a print server without any ill effects; your Mac spools the print job to your hard drive and then to the print server, which holds it until a printer is ready.

If a print server is easily accessible, you can check the page counts of the print jobs in front of yours and decide whether you need to cancel your print job or redirect it to another printer.

After documents have been printed, they're added to a log of print jobs. AppleTalk print servers can now spool to as many as six printers and give you a log for each one. Print logs give you an accurate record of who is using which printer and when — helpful information for network managers trying to decide how to distribute the printers in an organization. Checking the logs is also a good way to keep track of printing costs for projects.

The Standard

AppleShare Print Server (which used to be a stand-alone product until Apple rolled it into AppleShare Server 3.0) sets the standard for AppleTalk printer sharing. It's not the most full-featured product, but it's the easiest to set up and use. You install it with Apple's Installer program, either with the rest of the AppleShare Server package or by itself.

A dialog box lets you select up to five AppleTalk printers on your network; each printer is then associated

How We Tested

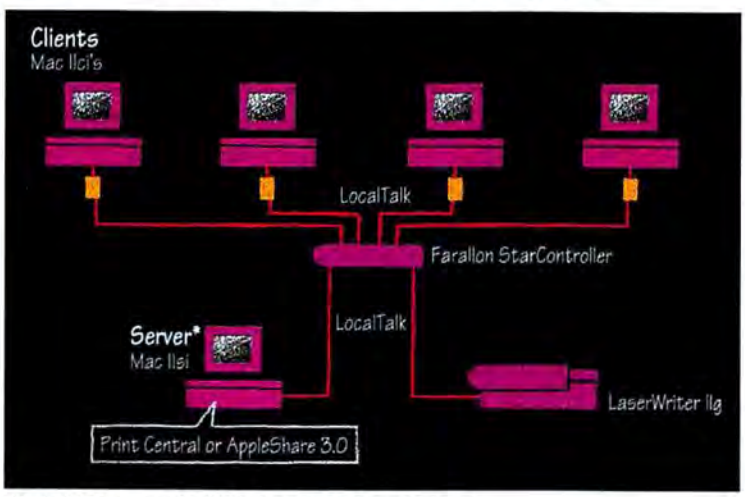
Our tests were designed to determine the relative speed differences among the products and to make sure that each is compatible with standard applications. To that end, we created four test documents: a 15-page Microsoft Word 5.0 file that included TrueType fonts; an 8-page Microsoft Excel spreadsheet; a single-page QuarkXPress document; and a single-page PageMaker 4.2 document. The PageMaker and QuarkXPress documents were as nearly identical as possible, using the same fonts and EPS and TIFF graphics.

We installed AppleShare Print Server and Print Central on Mac IIsi's and installed PServe on a Dell 320SX with a DayStar Digital LT200 LocalTalk board. The four client machines were Mac IIci's, and we printed to an Apple LaserWriter IIg. The devices were connected through a Farallon LocalTalk StarController.

With each document, we timed how long it took a single user to regain control of the cursor (the printing-in-the-background option was turned off during printing to the print servers) and when the last page of the document was output by the printer.

Multiuser tests were done with two and four clients, each printing the QuarkXPress document at the same time, noting cursor-return and printing times. We also did multiuser tests with each of the IIci's printing a different document, all started at the same time.

Other tests included error testing (turning off the printer, running out of paper, and so on), moving files among queues, hold-queue testing, and installation-and-setup testing.



*When testing PServe, we used a Dell 320SX with a LocalTalk-interface board as the server.

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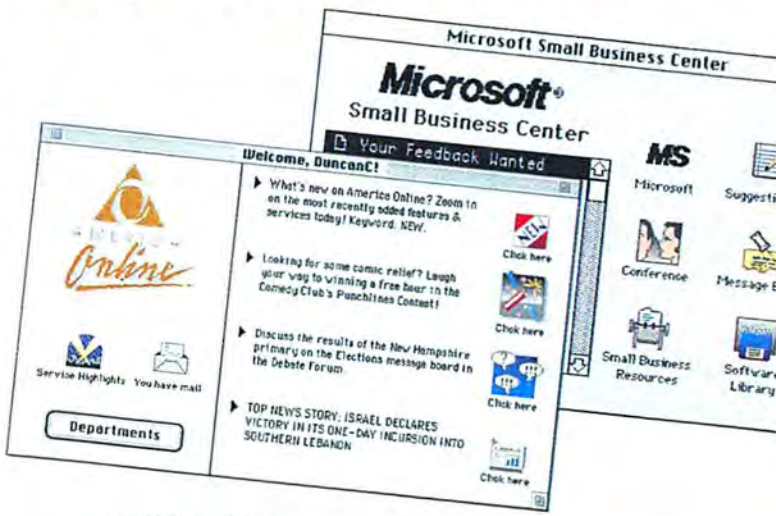

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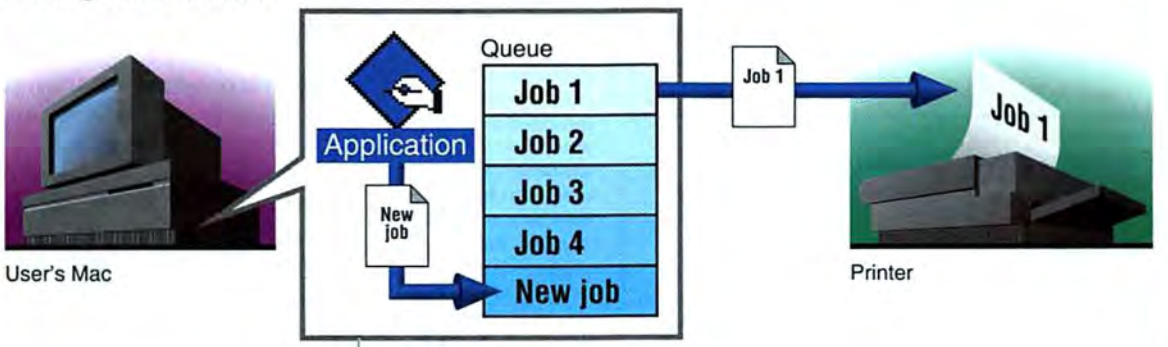
How It Works

Print-server applications are print spoolers that work over a network. Instead of waiting until a printer is available, a spooler stores printing data from a file, known as a print job, and sends it when the printer is available. Print servers take input from multiple users on a network and can output to multiple printers.

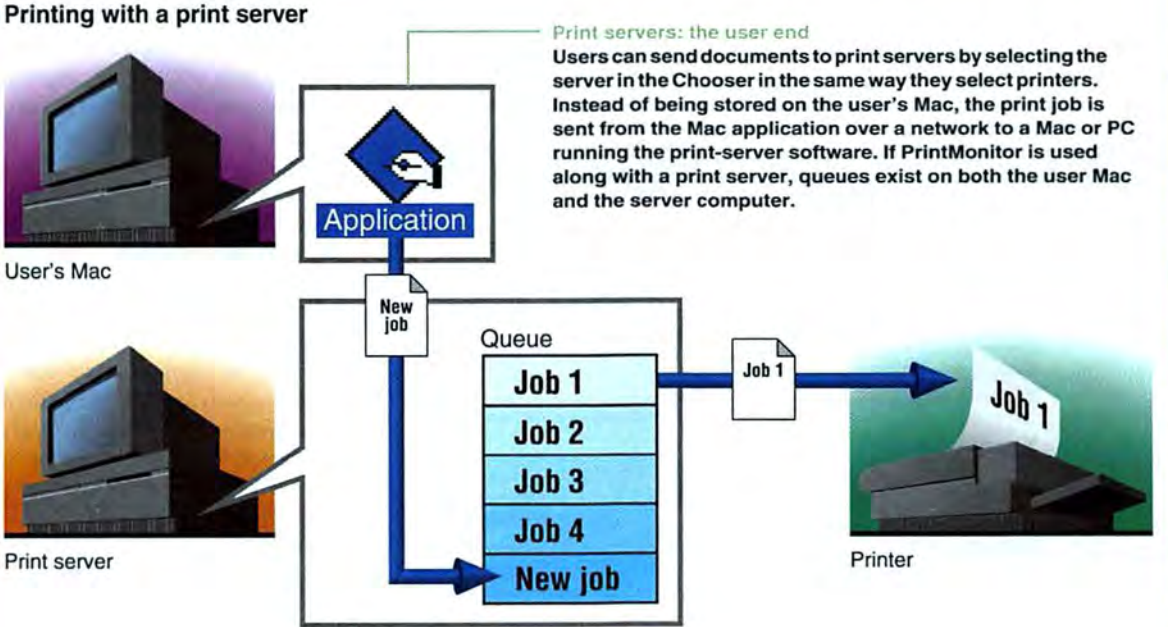
Printing with PrintMonitor



Local queue

PrintMonitor, the spooler application that comes free with the Mac's system software, intercepts print jobs between the application and the printer and stores them on the Mac.

Printing with a print server



Print servers: the user end

Users can send documents to print servers by selecting the server in the Chooser in the same way they select printers. Instead of being stored on the user's Mac, the print job is sent from the Mac application over a network to a Mac or PC running the print-server software. If PrintMonitor is used along with a print server, queues exist on both the user Mac and the server computer.

Print-server queues

Print servers process jobs on a first-come, first-served basis; incoming jobs go to the end of the queue, outgoing jobs come from the beginning. Print servers can process multiple queues at the same time. Some servers let you move print jobs among active queues.

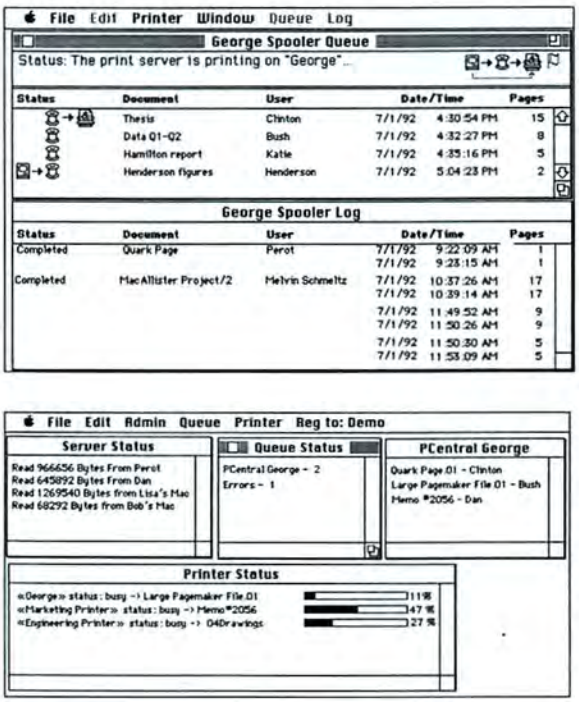


Figure 1: Glancing at the status screens for AppleShare Print Server and Print Central, you can see that they take very different approaches. Apple's server software (top) provides useful information in a form you can read. Print Central (bottom) displays useful and not-so-useful information scattered among several windows (with a menu bar that includes, oddly enough, the registered user's name — which has no menu attached). The third server application, PServe (not shown), has a standard strictly-text DOS interface.

with one queue (and hence, one name in the Chooser). Like the other print-server applications, Apple's product lets you replace the printer in your networked Macs' Chooser with the spooler. You can let users bypass the server by having the printer and the spooler appear in the Chooser; if a user selects the printer directly, that user will compete with the print server on a first-come, first-served basis.

AppleShare Print Server's easy-to-understand display shows a list of pending print jobs for each printer, identifying characteristics such as the user's name, the document name, and the number of pages for each job. The print log can also be displayed on-screen at the same time. Like AppleShare File Server, Print Server runs under System 7 and supports System 6 and System 7 users.

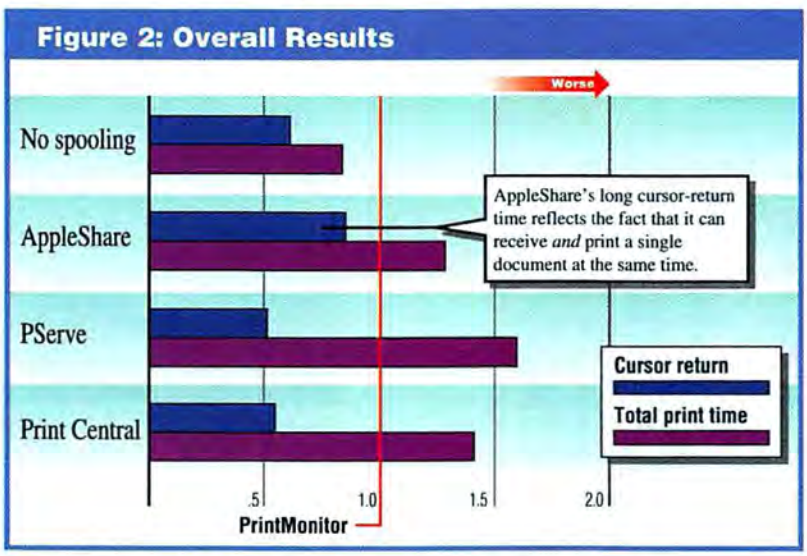


Figure 2: The combined results of our single-user tests show AppleShare as the overall fastest spooler for printing a single document. The print time for PrintMonitor, represented as a 1.0 in these normalized results, was shorter than that of any network print-server application, as expected. These results represent the combined times from our Word, Excel, QuarkXPress, and PageMaker test files.

The Home-Turf Challenger

Of the two challengers to AppleShare Print Server, Print Central is the only one that's also Mac-based (like AppleShare Print Server, it can run concurrently with AppleShare File Server) — but that doesn't mean it's as easy to use as the Apple product. The advantages it offers are strictly in the area of extra features.

One of these features is called *load balancing*. Print Central can distribute a print job to the first available of as many as six printers. This feature is helpful for using your printers efficiently — *if* your printers are grouped in one location (users need to be able to find their printouts). Print Central is also the only print-server application we looked at that lets you assign two or more printers to one queue (altogether, you can define as many as eight print queues); the other applications we tested must use a separate queue for each printer.

For further control over printing, Print Central lets you prioritize print jobs or send them to a different queue after they've been spooled to the print server — two capabilities AppleShare Print Server lacks. Print Central also allows you to control the server computer and the queues (as well as generate reports) from another Mac on the network.

Print Central includes some features that are particularly useful for networks with a variety of sophisticated printers, such as those at service bureaus. For example, you can associate any queue with a PostScript setup file that changes printer characteristics such as resolution or type of print media, so users can print a document

with those characteristics by sending the print job to the appropriate queue.

Unfortunately, Print Central is far from easy to use. To start with, there's no auto-install capability; you have to drag folders and files from the floppy disk to the server Mac's hard disk. Then you need to define the printers in the system, the queues you want to use, and the font list for each queue — performing each definition task in a window that has nonintuitive column headings such as *PC* and *GO* (you have to consult the skimpy, unindexed manual to find out that these initials stand for *page count* and *go online*). If you mistakenly define the same printer twice, Print Central won't warn you, and if you accidentally leave an item on a list undefined, Print Central won't recognize any definitions that follow the blank item. As a further frustration, you need to restart the application after entering these definitions — or any time you edit them.

The part of the Print Central interface you see the most, the status display, isn't particularly well designed either (see Figure 1). Status information is displayed in three separate, unrelated windows: the Printer Status window, which displays the name of the currently printing file for each printer but not what's already printed; the Server Status window, which shows you how many bytes the printer has received from each user (unimportant information for most people) but not how many pages; and the Queue Status window, which displays the number of print jobs assigned to each queue but without the word *jobs* to help you know what the number represents. When you print a log, you get a more useful set of information (print jobs, users, pages, and times), but printing is less convenient than seeing the information on-screen.

Another hindrance to smooth operation with Print Central is its response to a printer's going off-line. After manually restarting the printer, you need to activate the on-line property in the printer definition and restart the application.

The Nonconformist

PServe is a rare bird; it's a PC program that supports PCs and Macs but supports only AppleTalk printing protocols. Other PC-based print-server applications, such as those included in Novell's NetWare, Banyan's VINES, and Microsoft's LAN Manager, are built around their own proprietary network protocol and support AppleTalk as a secondary protocol.

PServe supports PCs equipped with AppleTalk hardware and software. Unlike NetWare and VINES, PServe supports only PostScript printers, so Hewlett-Packard LaserJets running only the printer-resident PCL language can't be used. The main advantage of using a PC for print serving is the low platform cost. However, the cost of a Mac may not be an issue if you use the same Mac you're using as a file-server platform.

A PC acting as host server can be on either LocalTalk or Ethernet, as can the users' computers. You can buy PServe bundled with a LocalTalk board for the PC, or you can buy the software alone and use a third-party LocalTalk product such as Farallon's PhoneNET Talk or DayStar Digital's LT200 (PServe does not support the TOPS FlashCard). You can put the PServe server on Ethernet, using PSLink, a set of network drivers that includes LocalTalk and EtherTalk drivers for a PC (PSLink works only with a 3Com 3C503 Ethernet board).

Installing PServe is a typical DOS procedure: You run an install program and make some changes to commands in the autoexec.bat file. Not a thrill for Mac fans, but we found PServe more straightforward to set up and use than Print Central. PServe comes with a utility that provides a list of AppleTalk-network nodes (Macs, PCs, printers, and so on) and the network applications (sockets) running on them.

PServe lets you define two queues for each printer (one of which is for holding documents to print later), and you can move print jobs among printers. You create the queue definitions by running a setup program, which lets you fill in an on-screen form. Then you use PServe commands to display status information, enable and disable printers, and cancel print jobs.

Some of PServe's error messages are arcane. For instance, if you get the message "Closed PAP Output: WARNING-NULL Job Info," it means you're trying to use a printer that's turned off. We found the on-line help's explanations to be much more useful than the error messages.

Another handy feature, called Limbo, gives you a place to store print jobs that are having trouble printing. With other print-server software, a job that's having printing difficulties must be deleted. With PServe, you can move the job into Limbo, save it until you find the problem, and then move it back into an active queue.

The Bottom Line

There is much to be improved in the world of print servers, because something is lacking in each of the packages we tested. With that in mind, our choice is Apple's **AppleShare Print Server 3.0** (with AppleShare Server: $1,199 list, $914 street). It doesn't have the most extensive feature set (it lacks the ability to move print jobs among queues and can't have multiple printers per queue, for example), but it is the fastest and easiest to use. You install it in ten minutes and then let it run by itself for months at a time. One negative aspect is that it isn't available separately — you have to buy the whole AppleShare Server package. (However, AppleShare Server is good file-server software for workgroups of about 20 Macs. We'll compare it with the latest batch of file-server products in an upcoming issue.)

If you have a PC you can dedicate for AppleTalk print serving and are willing to use a DOS product, COPS' **PServe 3.0** ($1,095 list, $897 street) is a possible choice. It has a better feature set than AppleShare Print Server, but it's slower. And because it doesn't support the non-PostScript printing languages common in the PC world, it isn't very useful as a cross-platform product.

Speed Testing

A print server's performance depends greatly on the speed of the hard drive and the speed of the server machine. So if you need to improve performance, invest in a fast hard drive.

We used Mac IIsi's for servers and IIci's for clients, plus a Dell 320SX with a 20-megahertz 80386SX processor for running the PServe software. We tested the servers on LocalTalk and Ethernet networks with an assortment of word-processor, spreadsheet, and page-layout documents (see the "How We Tested" sidebar).

There are two aspects of speed to consider with print servers: When does the print server return control of your Mac's cursor, and how long does it take for the document to finish printing? Not surprisingly, PrintMonitor returned control of the cursor faster than the print-server applications did. Spooling a document from your hard disk to your Mac's RAM is a lot quicker than spooling a document over a network to a print server.

AppleShare Print Server was the fastest overall. It was slightly slower than the other print-server applications in returning control of the cursor but much faster in getting the printed page out of the printer.

PServe had the slowest overall print speed and the worst performance degradation as more users were added. Even when we tried running it on a 33-megahertz 80386DX-based PC, it was still slower than the Mac-based print-server applications running on a 20-megahertz 68030-based Mac IIsi.

Spool Free or Buy?

Should you pay for a print server even though you get PrintMonitor for free? It isn't going to return control of your Mac any faster than PrintMonitor does. However, print servers do offer tools to help you manage your printer resources better — and you can spool PageMaker documents. The bigger your organization, the more likely a centralized print server will help. For our recommendation on which print-server software to buy, see the "Bottom Line" sidebar.

John Rizzo spools his print jobs as *MacUser*'s technical editor and author of *The* MacUser *Guide to Connectivity* (Emeryville, CA: Ziff-Davis Press, 1992).

Table 1 Criteria

List price — The server package's retail price.
Street price — The server package's average price through dealers surveyed across the U.S. in July 1992 or through mail order.
Server platform — The type of computer on which the server software runs and the operating systems it runs under.
Minimum server RAM — The minimum amount of RAM that must be available on the server platform in order to run the server software.
Max. no. of printers — The maximum number of printers to which the server can spool documents.
Max. no. of queues — The maximum number of queues you can set up to hold documents being spooled to printers.
Multiple printers/queues — Does the server software allow you to set up queues that spool to multiple printers?
Redirect print job — Does the server software let you move print jobs from one queue to another after they've been spooled?
Send setup files — Does the server software let you send PostScript files to printers to change printing characteristics such as resolution?

Table 1: Features of Print Servers

● = yes ○ = no	AppleShare Print Server 3.0 *	Print Central 2.0 $$$	PServe 3.0 $$$½
List price	$1,199 for AppleShare Server 3.0	$795	$1,095
Street price	$914	$740	$897
Pros	Fastest. Easiest to use.	Good feature set.	Good feature set.
Cons	Short on features.	Poor interface.	Slowest.
Server platform	Mac with System 7	Mac with System 6 or System 7	286 or later PC with DOS 3.1 or later
Minimum server RAM	4 MB	2 MB	512K
Max. no. of printers	5	6	8
Max. no. of queues	5	8	16
Multiple printers/queues	○	●	○
Redirect print job	○	●	●
Send setup files	○	●	●
Company	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-776-2333 408-996-1010	Compumation, Inc. 820 N. University Dr. State College, PA 16803 800-776-6537 814-238-2120	COPS (CoOperative Printing Solutions), Inc. 5950 Live Oak Pkwy. Ste. 175 Norcross, GA 30093 404-840-0810

*Not available as a stand-alone product.

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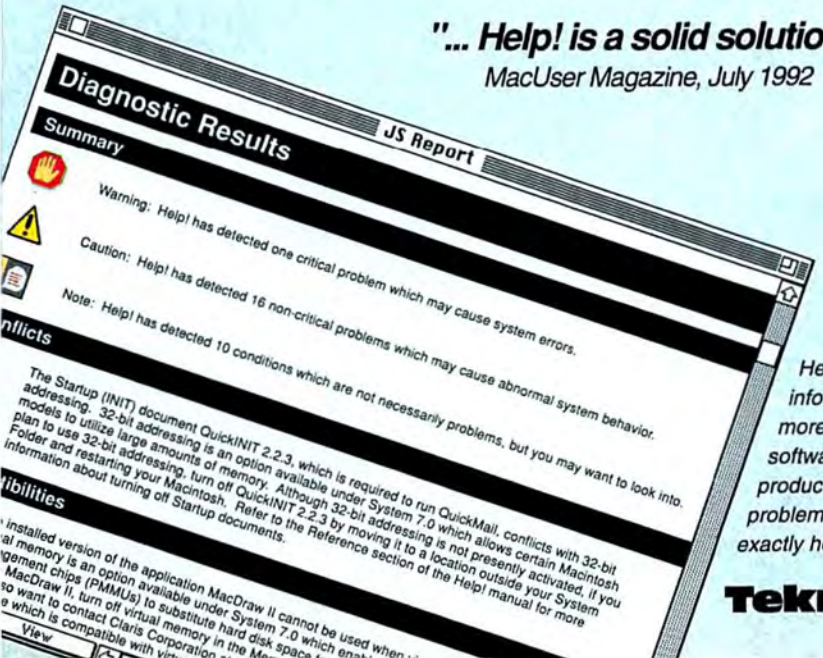

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CIRCLE 138 ON READER SERVICE CARD.

10T HUB
Shiva
Hub
NRC Network Resources Corporation
MULTIGATE® HUB
TECHWORKS
10BASE-T ETHERNET HUB
MR9T
802.3 10BASE-T
MULTI PORT REPEATER
WITH LANVIEW®
POWER INPUT
CABLETRON SYSTEMS
The Complete Networking Solution
PORT 9
8X
7X
6X
5X
4X
3X
2X
SN
PWR
CLN
RCV
LNK
PORT 9 8 7 6 5 4
POWER REQUIRED: 15V ⎓ , 900mA MAX
DATA CAPABILITY: 10Mb/s
AGENCY APPROVALS
PENDING

10BASE-T Hubs:

Stars on the Ethernet Horizon

It's never been easier to set up and manage an Ethernet network — if you choose the right 10BASE-T hub.

BY STEFAN B. LIPSON

It's Friday, ten minutes till five, and you're downloading a weekend's worth of work from your office file server. Unfortunately, your workaholic coworkers all have the same idea, and your LocalTalk network — like a freeway at rush hour — has slowed to a crawl.

Meanwhile, dozens of people from another department — those lucky enough not to have their Macs on a LocalTalk network but instead have them on the fast corporate Ethernet network — are streaming out the front door. LocalTalk's lethargy is not only keeping you from your weekend but it's reducing your department's productivity as well.

LocalTalk is slowing you down — and it's only going to get worse. Today, you and your coworkers are transferring and printing larger data files than ever before. Tomorrow, files will be even larger. Scanned images, sound files, QuickTime movies, and desktop-publishing files can be dozens of megabytes in size. But anyone who sends big files across a LocalTalk network confronts its paltry transmission rate of 230 kilobits per second.

Enter Ethernet. A network standard embraced by businesses and universities for more than two decades, Ethernet offers a maximum transfer rate of a whopping 10 megabits per second — more than 40 times the data-carrying rate of LocalTalk. Although current technology limits the rate of data transfer to a level well below Ethernet's top rate, Ethernet networks are able to transmit big files at a dizzying rate.

Speed gains are but one aspect of the package. The folks in your company who are connected by Ethernet are enjoying other benefits, not the least of which is cheaper and easier multiplatform connectivity — especially if they're using equipment that conforms to the 10BASE-T Ethernet standard, published by the IEEE (Institute of Electrical and Electronics Engineers) in 1991. 10BASE-T can be inexpensive, because it allows Macs, PCs, mainframes, file servers, and printers to be connected by *unshielded twisted-pair* (UTP) cable, similar to the phone wiring found in modern office buildings (see the "Cable Evolution" sidebar). Older Ethernet standards require more-expensive *coaxial* cable.

PHOTOGRAPHY: FRED STIMSON

10BASE-T networks are easier to manage than those based on older Ethernet standards, because they're arranged in a *star topology.* At the center of the star is a *10BASE-T hub,* a wiring center with several 10BASE-T *ports,* similar to the wall jacks you use to connect your telephone. One computer, printer, or other such device on the network is connected to each port. The hub receives an electrical signal from any device connected to it and repeats it clear and strong across the network, strengthening the transmission and enhancing your network's reliability. Networks based on older Ethernet standards use a bus topology, with devices connected one after another in a chain. With a star topology, if a cable breaks, the network remains active, because the hub partitions the malfunctioning port to prevent it from interfering with the network. With a bus topology, if a cable breaks, the chain is broken and the network either separates into two segments or fails entirely.

A star topology doesn't limit the number of devices on your network to the number of ports on your hub: Two or more hubs can be *cascaded,* allowing your network to support a larger number of devices and letting you easily add devices. However, when you cascade two hubs, you run a cable from a 10BASE-T port on one hub to a 10BASE-T port on another, so you can't then use those ports for Macs, printers, or other devices. A better alternative is to connect hubs on a thinnet backbone, discussed later in this article.

The Hub of the Matter

For this report, we tested 14 hubs: 12 *nonmanaged,* or *dumb,* hubs and 2 *managed,* or *smart,* hubs. Managed hubs not only perform the basic signal-repeating and partitioning functions that dumb hubs do but they also include network-management software for configuring and optimizing hub characteristics as well as monitoring network activity. Managed hubs provide a central point for management, network security, and troubleshooting. The two managed hubs we tested — the 12-port Farallon PhoneNET StarController EN and the 24-port NRC MultiGate Hub — were the only ones available that offered Mac-based management at the time of our testing.

After extensively testing the hubs in several configurations (see the "How We Tested" sidebar), we confirmed our expectations that all the hubs, whether managed or nonmanaged, performed file transfers at almost the same speed — fast. When shopping for a hub, don't quibble about tiny differences in performance. Look instead at engineering, design, documentation, warranties, and the quality of technical support provided by the vendors.

What Price Stardom

10BASE-T is popular because it offers so much for so little. However, installing a 10BASE-T network is not simply a matter of plugging your Macs and printers in to a phone jack. There's no guarantee that your phone lines have the number of send and receive wires required by Ethernet or that they're of good enough quality to handle data adequately. And even if your wiring is 10BASE-T-capable, you may nevertheless find it necessary to install extra wire to accommodate multiple devices within each office. But whether your building's wiring is ready for 10BASE-T or not, the time to move to Ethernet is now: Vendors have dropped prices on

Figure 1: Price per Port

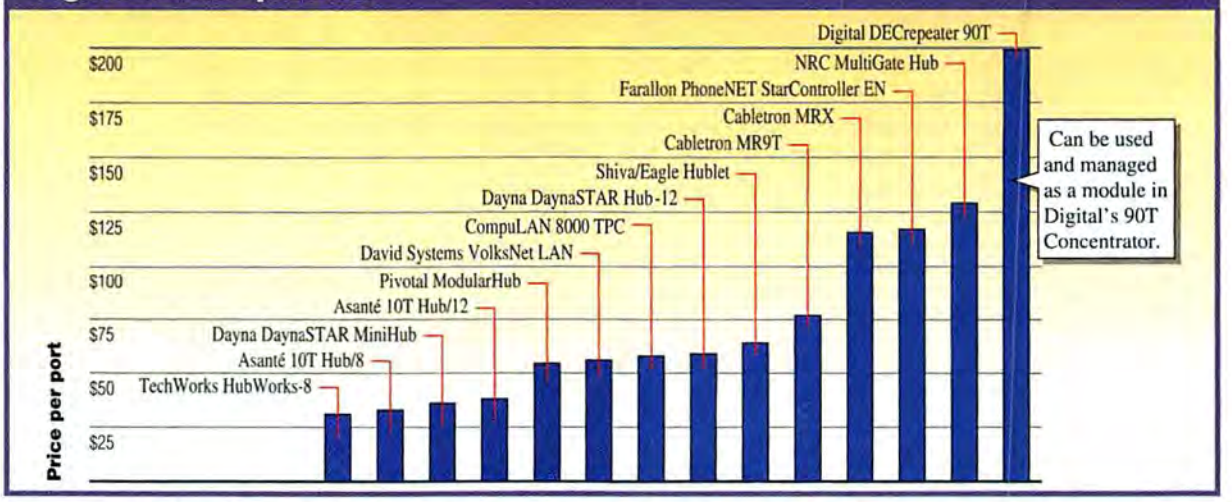
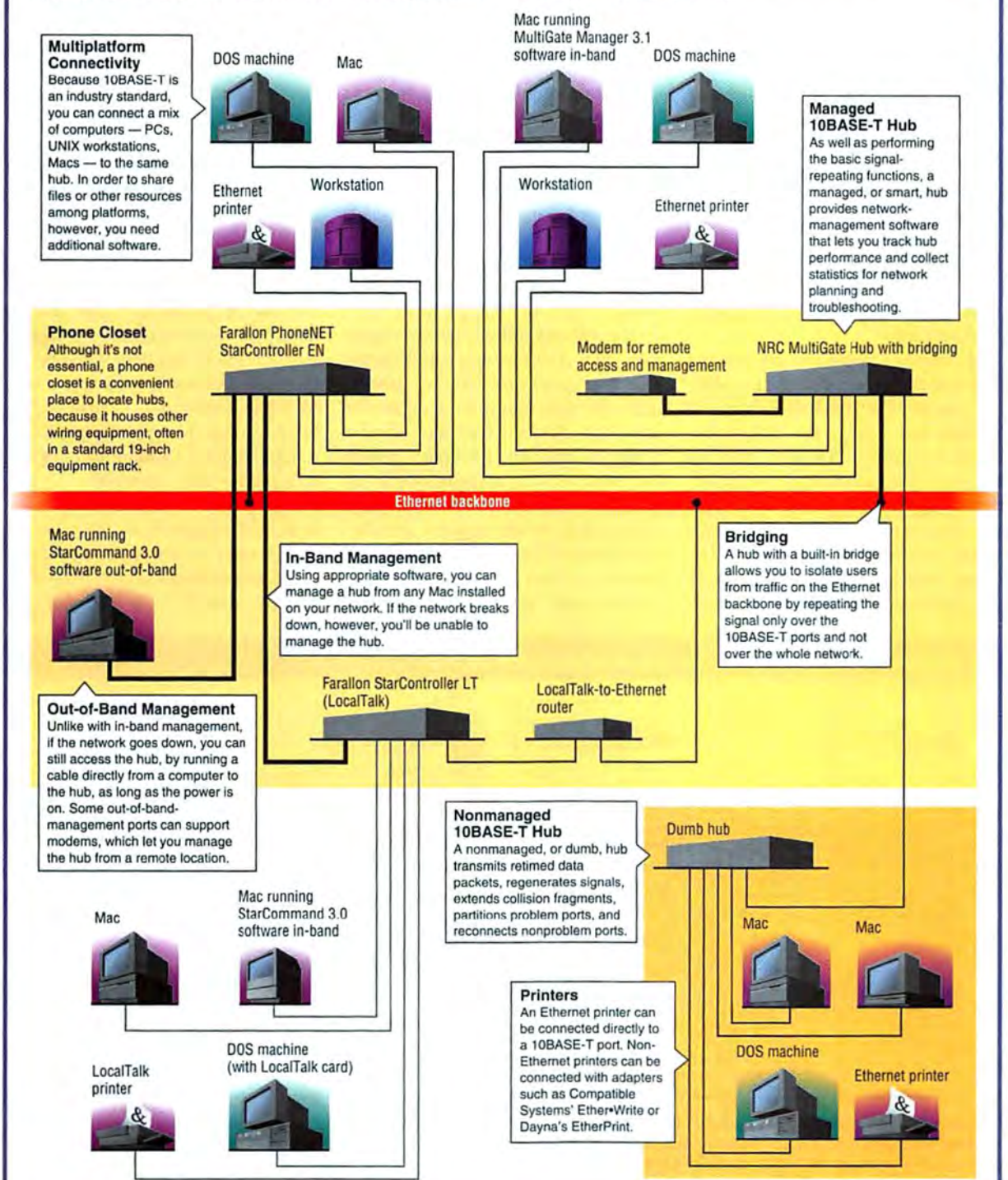


Figure 1: Different 10BASE-T hubs have different numbers of ports, so what you pay for the hub itself may be less important than what you pay per port (before considering the cost of Ethernet cards, wiring, and other hardware). Remember that the per-port price doesn't tell the whole story, because hub features vary widely. We arrived at the price per port by dividing the street price — the price you'd pay a dealer or a mail-order supplier — by the number of 10BASE-T ports on the hub.

It Only Looks Complicated

Nothing as complex as an office network could ever be described as truly easy to manage, but a 10BASE-T Ethernet star topology comes about as close as you're going to get. In a star topology, each device, or node, communicates through a central hub; if one wire breaks, the rest of the network is unaffected. In a linear bus topology, used in older Ethernet setups, if a wire breaks, the chain is broken and the network either separates into two segments or fails entirely.



Ethernet products to record lows.

Before committing to 10BASE-T, consider the advantages of the older Ethernet standards, which do not require the use of a hub: 10BASE-5 thicknet and 10BASE-2 thinnet (see the "Cable Evolution" sidebar). Each offers advantages and disadvantages. Thicknet cable has better shielding and can run longer distances — as far as 500 meters between devices. Thinnet cable is less expensive (it's also known as *cheapernet*), but cable segments can be no longer than 185 meters. Thinnet cable is most commonly used as a *backbone* — a route for transporting information over all parts of a network — when devices aren't far enough apart to require thicknet cable.

10BASE-T cable can be cheaper than either thicknet or thinnet cable, but you need a 10BASE-T hub and the standard restricts the distance between devices to 100 meters. Many of the costs of installation are not immediately obvious. For example, each Mac needs an Ethernet-interface card, which serves as the connection between your Mac and the network. If you're lucky — or wealthy — enough to own a Quadra with built-in Ethernet capability, you don't need a network-interface card but you do need an AUI (attachment-unit interface) adapter.

There is also a price to pay for other Ethernet services. To share files with non-Mac platforms such as PCs and UNIX workstations, for instance, you need file-translation software. Also, connecting your LocalTalk printers to an Ethernet network requires Ethernet-to-LocalTalk routers.

A Star Is Born

Whether managed or nonmanaged, all hubs perform the same basic function: They receive a signal in one port and rebroadcast it to all the other ports. Additionally, all hubs check for low-level errors and indicate them via flashing LEDs. For example, an Ethernet card may produce excessive *jabber*, data sent to the hub without regard for any other devices that may also be trying to transmit. Excessive jabber can cause *collisions*. Collisions occur when two devices, or *nodes*, transmit data packets on the network simultaneously and the signals collide and become garbled. If a single port experiences more than 31 simultaneous collisions, the hub simply *partitions* the port, which means that it shuts the port down and waits until the network is clear before reactivating the port. Error messages allow you to find broken hardware and plan your network more effectively.

Among the 14 hubs we tested, the price per port varied greatly, particularly between the managed and the nonmanaged hubs (see Figure 1). The Shiva Hublet has the lowest list price, but it has only 4 ports, so its price per port is high. The Asanté 10T Hub/8 lists for more, offers 8 ports and an LED display, and has a price per port about half that of the Shiva Hublet. And although the DECrepeater 90T can also be used as a module in Digital's 90T Concentrator — a chassis that can house multiple network devices and that provides an application for managing them — it carries a prohibitive price per port (Digital customers in good standing can get significant discounts, though).

Managed hubs are more expensive than nonmanaged hubs, because the former offer a software-based feature set. If your network is growing, you'll quickly need at least one managed

Figure 2: Software Features of Managed Hubs

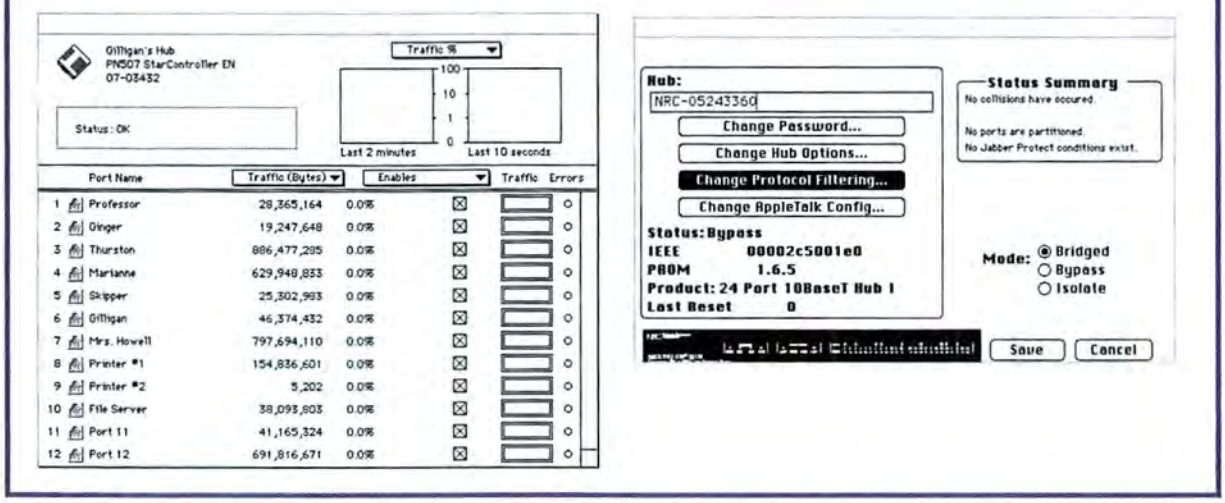


Figure 2: The main window of Farallon's StarCommand 3.0 (left) shows the various features of the software, among them port naming, error tracking, port enable/disable, and traffic tracking. NRC's Hub Command & Control window (right) shows a few of the unique features of NRC's MultiGate Manager 3.1: You can change your password, hub mode, hub options, and filter protocols.

hub for monitoring hub and network activity and utilization. Each of the managed hubs we tested provides password security to prevent access by unauthorized personnel.

Managed hubs offer two management approaches: *in-band* and *out-of-band.* In-band management enables you to manage the hub from any Mac on the network — you don't need to be near the hub to monitor its activity. If the network fails, however, you can't manage the hub. With out-of-band management, you plug a Mac directly in to a port on the back of the hub. Thus, out-of-band management is useful if your network crashes and you need to access the hub. The Farallon PhoneNET StarController EN and the NRC MultiGate Hub each offer both methods. Farallon's out-of-band-management software has a graphical user interface, but accessing its in-band management is possible only via a Farallon LocalTalk StarController connection — a cumbersome task.

Some of the hubs we tested, including the Asanté 10T Hub/12, the TechWorks HubWorks-8, and the two managed hubs, can also be connected to Ethernet cards manufactured before — and not in strict accordance with — the 10BASE-T specification. These hubs let you turn off the *link-status test,* a troubleshooting test executed by 10BASE-T devices but incompatible with pre-10BASE-T ones.

The NRC hub also offers a built-in *bridge,* which filters all traffic between the backbone and the 10BASE-T ports so that only the traffic bound for devices on the other side of the bridge can get through. The bridge makes it take a little longer to transmit a packet from one node to another, because the packet addresses are read during filtering, but the overall efficiency of the network improves, because of a decrease in the amount of traffic on the network backbone. A bridge can be a great performance booster for a large network, but it's of little help for a smaller one, unless it's exceptionally busy.

Cable Evolution

Thicknet, thinnet, unshielded twisted-pair, fiber-optic — cabling can be the most complex and expensive component of your Ethernet network. If you work in an office building constructed within the last three years, your telephone wiring may already be Ethernet-capable. But even if it is, most office buildings have only enough wiring to keep the receptionist busy.

If you need more cable or if you have to start from scratch, you'll need to answer a few questions: What type of cable do I need? How many twists per foot? What shielding quality? What cable lengths? You need to learn a bit about cable evolution.

Unshielded Twisted-Pair

This type of cable is used for phones and for connecting your 10BASE-T hub to your Macs, PCs, printers, and other devices on the network. *UTP* (unshielded twisted-pair) Ethernet cable commonly consists of eight wires twisted together in pairs. Two pairs are used for the telephone; the other two pairs — one pair for sending data, the other pair for receiving — are connected to the Ethernet card in your Mac. If you want to provide a redundant (backup) LocalTalk network or phone lines for modems or fax machines, you'll need extra pairs.

The IEEE has defined five levels of UTP cable. The difference among the levels is the number of twists per foot, with Level 5 cable — the most expensive — being the one with the greatest number of twists. The more twisted your cable is, the higher its resistance to outside interference and the clearer the electrical signal. Level 3 is recommended for connecting office networks, whereas Level 5 is used mostly for connecting networks in separate buildings.

Thinnet

Until 10BASE-T appeared, thinnet cable was the most popular for Ethernet. Thinnet cable is able to run longer lengths, is less susceptible to noise than UTP cable, and is generally used as a network backbone; however, it's significantly more expensive. Although thinnet cable looks similar to that used for cable TV, it has different electrical properties. For instance, the *characteristic impedance* of TV cable is higher than that of thinnet cable. If your cable installers have run out of Ethernet cable, don't let them tell you that TV cable will do just as well. It won't. An impedance mismatch greater than the 4 percent specified by the IEEE can cause severe signal degradation.

Thinnet cable complies with the IEEE's 10BASE-2 specification for Ethernet cabling, which states that a cable segment must have a minimum length of .5 meter, can run a maximum of 185 meters, and can support a maximum of 30 nodes. An installer may try to convince you that a thinnet-cable segment can be stretched several hundred feet beyond the IEEE specification without any performance penalty. Although the network may function with such a segment, it may experience an excessive number of retransmits, caused by signal degradation, that may go unnoticed because of light network load.

Thicknet

Thicknet (10BASE-5) cable is not only capable of supporting greater distances than is either 10BASE-T or thinnet but it is also less susceptible to outside interference — and it's more expensive than thinnet cable. Each cable segment must be a minimum of 2.5 meters and can reach a maximum of 500 meters. Each run of thicknet cable can support a maximum of 100 nodes. Experts consider thicknet cable the dinosaur of the Ethernet-cable group — huge and reliable but past the evolutionary wave.

Fiber-Optic

Fiber-optic cable carries an electrical signal that has been converted into a light signal. Once it reaches its destination, the signal is converted back into an electrical one. Because of its immunity from interference, its enhanced security, and its capacity to cover greater distances, fiber-optic cable is the best for building-to-building connections and is often used as a backbone for connecting multiple hubs. It's at least twice as expensive as UTP cable, although it can support very high bandwidths such as that of FDDI (Fiber Distributed Data Interface), which has a transmission rate of 100 megabits per second.

— Alfred Melo

Star Power

The hubs we tested provide anywhere from 4 (the Shiva Hublet) to 24 (the NRC MultiGate Hub) 10BASE-T ports for connecting devices. These connections are usually made with RJ-45 connectors, similar to the plug at the end of telephone wire. If the hub offers 12 ports or more, an *RJ-21* connector and cable (sometimes called an *amphenol connection*) — equivalent to 12 RJ-45 ports — is often provided. The RJ-21 cable runs between the hub and the *punch-down block* in your building's central wiring site, the phone closet. Some hubs, such as the Shiva Hublet, are like a power strip for 10BASE-T devices and are designed to be installed outside an office's phone closet. Many of the hubs also provide a 10BASE-5 15-pin thicknet, or AUI, port for connecting to a backbone as well as a 10BASE-2 thinnet, or *BNC*, port. By using the appropriate *MAU* (media-access unit), you can configure the AUI port as an extra 10BASE-T, thicknet, or fiber-optic port.

Like most things Macintosh, installing a 10BASE-T network is simple. Many of the hubs — the Cabletron MR9T, Dayna DaynaSTAR MiniHub, TechWorks HubWorks-8, and Asanté 10T Hub/8 — are small enough to sit on a shelf. In most cases, however, the hub should be installed in your phone closet so that all your cabling can easily be efficiently laid and traced — well over half of LAN downtime is due to faulty cabling.

You may want to save space by mounting your hub on a wall. Some of the hubs, including the Cabletron MR9T, the Farallon PhoneNET StarController EN, and the David Systems VolksNet LAN, are particularly well designed for this method of installation. If your network is large or if you expect it to grow, you may want a rack-mountable hub. The Cabletron MRX, CompuLAN 8000 TPC, Dayna DaynaSTAR Hub-12, and NRC MultiGate Hub each fit nicely in a standard 19-inch rack.

The Not-So-Fine Print

Despite what some ads may imply, the Mac's ease of use has not made manuals dispensable. For the most part, the hubs we tested include fine documentation. Aside from procedural guides, some manuals, such as that for the Asanté 10T Hub/12, contain a glossary of relevant connectivity terms. Farallon's documentation is excellent, as is NRC's, although we feel that Farallon's manual for StarCommand, the company's hub-management software, has the edge.

Some manuals, notably those for the David Systems VolksNet LAN and the TechWorks HubWorks-8, include easy-to-read instructions as well as good supplementary 10BASE-T background information. We were disappointed with the documentation that accompanied the Shiva Hublet and the Pivotal ModularHub, though — neither was sufficiently informative.

Engineering Elegance

The design and engineering of the hubs vary considerably, because the hubs' features and the type of network each is intended for are so different. For example, NRC's managed MultiGate Hub is most appropriate for large networks. The MultiGate is a sturdy, metal, rack-mountable unit that is extremely well engineered; the front panel includes an excellent display, with individual red and green traffic and status lights for each of its 24 ports; LEDs for power, fault, filter, and thinnet activity; and status lights showing the activity of the hub's built-in bridge. The MultiGate's back panel includes two RJ-21 connectors (one for each set of 12 ports), a thicknet port, a thinnet port, an RS-232 management port, external reset capabilities, an on/off switch, and an internal power supply.

In contrast, the Shiva Hublet is made of plastic and is slightly larger than a pack of playing cards — it's designed for light use on a small network. The Hublet has only four 10BASE-T ports, a power indicator, and one traffic light. Granted, it doesn't offer the features of the MultiGate Hub, but it's less

Network Nonconformists

For those who have a LocalTalk network and want better performance without the cost and hassle of converting to Ethernet, the LocalSwitch, from Tribe Computer Works, is one unconventional but effective solution (see "Making the Switch," December '91, page 207). The 16-port LocalSwitch serves the same function as a LocalTalk hub but avoids LocalTalk's throughput limitations by dynamically establishing as many as 8 separate and simultaneous connections among its 16 nodes. Each connection transmits at LocalTalk's 230-kilobit-per-second speed. Even though the bandwidth is not increased, 8 simultaneous conversations at 230 kilobits per second each can boost overall throughput as high as 3.6 megabits per second.

Tribe will also soon be offering a LocalTalk concentrator with eight slots for managed LocalTalk hub modules that have bridging capabilities. Each module has 8 LocalTalk ports and 1 Ethernet port (a module can also be used as a stand-alone hub). Like the LocalSwitch, each module can establish multiple LocalTalk conversations simultaneously (at 230 kilobits per second), and each LocalTalk port can also establish a separate and simultaneous conversation with the module's Ethernet port. Tribe Computer Works, 1195 Park Avenue, Suite 211, Emeryville, CA 94608; 510-547-3874.

If you're in an older building with wiring that doesn't meet the 10BASE-T specification, you have two choices: rewire or use a Tutankhamon NetMagic hub. This hub allows you to run Ethernet over low-grade, single-pair, unshielded twisted-pair cable instead of meeting the IEEE standard's high-grade, two-pair cable requirement. NetMagic's advantage is also a possible disadvantage, however: Although it performed well in our preliminary tests, you may not want a mission-critical network to rely on a device that does not fully conform to the Ethernet specification. Tutankhamon Electronics, Inc., 2446 Estand Way, Pleasant Hill, CA 94523; 510-682-6510.

How We Tested

We spent a month in the MacUser NetWorkShop testing the 14 hubs for this story to answer two basic questions: Does each hub perform in accordance with the 10BASE-T specification from the IEEE, by not introducing network delays? And if any do introduce delays, does one introduce more delays than another?

To find out, we configured 16 test Macs — clients as well as servers — with Asanté MacCon II/E Ethernet AUI cards (with 16K of RAM), Apple's EtherTalk driver, and System 7.0.1 with Tune-Up 1.1. All the machines were equipped with an internal Quantum 80-megabyte hard drive, a Farallon StarConnector EN (an AUI-to-10BASE-T transceiver), 5 megabytes of RAM, and a disk cache of 128K. We installed AppleShare Server 3.0 client software on half the Macs and AppleShare Server 3.0 server software on the other half. We paired each client with 1 server to give us 8 server/client pairs.

We used a CXR/Digilog LANVista 200 network analyzer to precisely monitor the nature of the network traffic: instances of *collisions* (when data is garbled because transmissions have occurred simultaneously from two or more nodes), *runt packets* (packet fragments left over from collisions and other network anomalies), and *CRC errors* (packet-content errors discovered during a *cyclic redundancy check,* a common mathematical error-checking algorithm). Network-utilization data was also noted.

To generate and maintain a steady level of background traffic, we ran an MPW (Macintosh Programmer's Workshop) script that automated the process of constantly writing, and subsequently overwriting, 1-megabyte files between our server/client pairs.

In order to determine baseline performance data — network performance without a 10BASE-T hub — we connected 2 server/client pairs and our LANVista to a thinnet Ethernet backbone. We invoked our MPW script on 1 of the server/client pairs and recorded network statistics. We then timed and recorded how long it took to copy a folder containing five 1-megabyte files between the other 2 Macs, our test pair. We repeated this process while incrementally adding 2 server/client pairs, each running the MPW script, and timed Finder copies at each stop along the way, until we had all 16 machines on the network.

Once we had established our baseline numbers, we began testing the hubs. Again, for each of the hubs tested, we first connected 4 Macs and the LANVista to the hub and ran our tests. As we added Macs and took measurements, we also tested ten configurations. In addition to increasing the number of machines on the network, we increased the number of interconnected hubs from one to two and then to three. We connected the hubs first via a thinnet connection and then via 10BASE-T ports, using a crossover cable. Then — in multiple-hub configurations — we connected the test client and server machines first to the same and then to different hubs (see Figures A through C).

After all this effort of configuring, testing, reconfiguring, and retesting, we discovered what we had suspected when we plugged the first Mac in to the first hub: that the delay introduced by using any of the hubs we tested was negligible. No matter how we configured our network, as we increased the number of Macs, the only degradation in performance was due to higher network utilization and increased collisions — delays that were the by-products of additional loading and that were not introduced by the hubs themselves.

— Mark Bieler

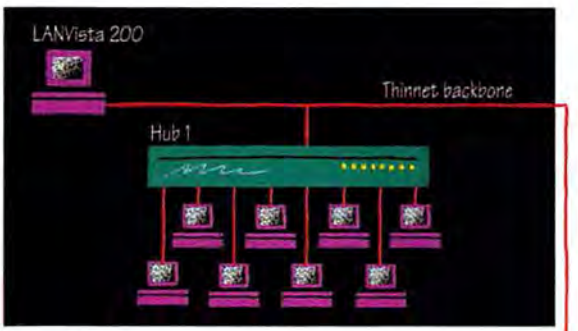


Figure A: We installed hub 1 on the thinnet backbone and connected Macs in increments of four. Two Macs were used to copy a 5-megabyte folder across the network. The remaining Macs generated background traffic.

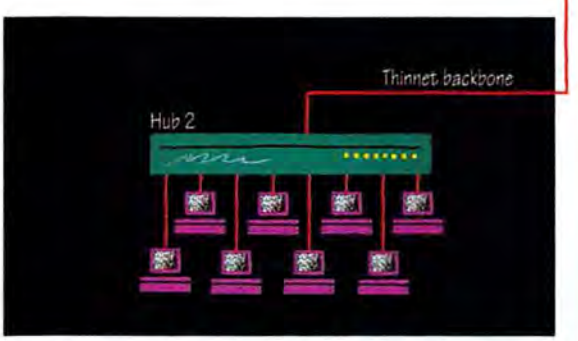


Figure B: When all the ports on hub 1 were occupied, we installed hub 2, connected the additional Macs, and repeated the tests.

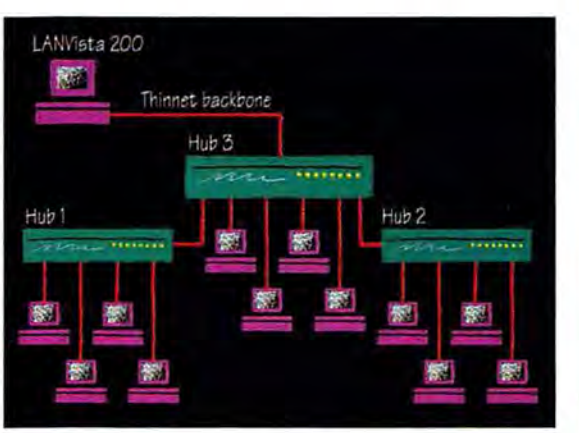


Figure C: We also cascaded three hubs and noted the time it took to copy the 5-megabyte folder between hub 1 and hub 2 via hub 3. We found that changing the configuration had a negligible effect on transfer speed.

than one-tenth the price — in fact, it has the lowest list price of any hub we tested. The Hublet is ideal for an office that already has 10BASE-T but needs to quickly and easily install a few extra nodes.

Although many of the products have features that overlap, many of them offer features that make them stand out — for better or for worse. The Dayna DaynaSTAR Hub-12, for example, comes with an RJ-21 port and a free *harmonica block* — a convenient adapter that lets you use 12 RJ-45 connectors instead of the RJ-21 port. It also has an internal power supply and lights to indicate the link and partition status of every port. The Digital DECrepeater 90T can be used as a stand-alone 8-port hub, but its strongest feature is that it can be used as a plug-in module in the company's concentrator.

Star Quality

The TechWorks HubWorks-8 and the Asanté 10T Hub/12 are particularly well designed. The TechWorks HubWorks-8 offers 8 10BASE-T ports, a thicknet and a thinnet port (with a selection switch to indicate which one you're using), and a switch bank for disabling the link test on a port-by-port basis for compatibility with pre-10BASE-T devices. With some hubs, cascading two hubs via a 10BASE-T port requires a crossover cable, a cable in which the send and receive lines have been switched. TechWorks instead includes a switch that reverses the send and receive wires on port 8, so you don't need a crossover cable.

TechWorks provides an excellent LED display for an inexpensive unit, including jabber lights to let you know when and where your Ethernet cards are acting up and link-status lights on each port. It also has polarity lights to indicate whether your hub's receive wires are crossed.

The Asanté 10T Hub/12 offers no less. Its sturdy metal case houses the same features as the TechWorks hub as well as four more ports. Asanté also includes a removable RJ-21 faceplate so that you can use either an RJ-21 connector or 12 RJ-45 ports. The hub has a separate LED for each port, including the thicknet and thinnet ports, to let you know when a port has been partitioned due to too many collisions. It also has link-status LEDs on each port.

Some of the hubs are not without quirks. The Pivotal ModularHub provides only link-status lights and has no traffic indicators. In addition, although Pivotal lets you configure port 12 for cascading, you must unscrew and open the hub and set an internal jumper to do so. We also found a foible in NRC's otherwise excellent MultiGate Hub: When we set the DIP switch for a thinnet connection and turned on the hub without connecting a wire to the port, the hub was so confused that the external Reset switch was rendered inoperable and we had to open the case and manually reset the hub. According to NRC, the problem has now been fixed.

The CompuLAN 8000 TPC had a more readily identifiable problem: The seemingly independent send and receive LEDs on the front panel weren't independent at all; they all flashed, regardless of which port was sending and/or receiving. Finally, we couldn't help but notice that the CompuLAN name does not appear anywhere on the product or in the documentation.

When Good Hubs Go Bad

If your hub vendor doesn't provide you with adequate technical support, your purchase may prove to be less of a bargain, regardless of the price. To see what sort of support you might expect in your hour of network need, we made calls to each hub vendor's

On the Horizon

Thanks in part to the overwhelming acceptance of 10BASE-T, hub vendors are continuing to offer greater feature sets at lower costs. For example, in June, Asanté began shipping the AsantéHub 1012 managed hub and AsantéView, accompanying network-management software, available in both Mac and Windows versions. The 12-port AsantéHub 1012 appears to be ideal for a mixed-platform environment. AsantéView's graphical user interface looks the same on the Mac as it does in Windows and is designed for both in-band and out-of-band management.

The AsantéHub 1012 includes redundant-backbone support, so if one backbone connection goes down, the hub automatically switches to the other backbone. SNMP (Simple Network Management Protocol), a standard that facilitates highly flexible network management — and which Apple recently embraced — is also supported in AsantéView. AsantéView's SNMP-based in-band management lets you monitor and configure individual network connections from a single management station. SNMP requires Asanté's optional SNMP card, priced at $399.

AsantéView also lets you access network-management features remotely. If you have both a modem and a beeper, you can have the AsantéHub 1012 dial your beeper number when network problems arise. The suggested retail price for the AsantéHub 1012 with AsantéView is $1,999.

Farallon Computing has announced the FarallonConcentrator, an 11-slot rack-mountable cage for housing and connecting LocalTalk and Ethernet modules such as hubs. The product includes StarCommand hub-management software for managing all devices connected in the rack. Current StarController hubs can be used in the concentrator, which also features hot swapping — the ability to remove or install modules without bringing down the network. The FarallonConcentrator costs $2,990.

NRC has announced the NRC MultiGate Hub 2, a more muscular version of the MultiGate Hub that supports WANs (wide-area networks). The MultiGate Hub 2 is twice the height of the original MultiGate Hub and lets you connect as many as 24 devices, using 10BASE-T. It can also be configured with two WAN connections at speeds of 9,600 bps to 1.54 megabits per second and provides bridge capabilities between the WAN and the hub. The LED display includes indicators for WAN and remote-console activity. The MultiGate Hub 2 supports SNMP management via both the TCP/IP and the AppleTalk protocols. Its suggested retail price is $5,995.

tech-support line and asked a few pressing questions — without identifying ourselves.

We were pleasantly surprised to find that a few vendors — Digital, Pivotal Technologies, and TechWorks — offer toll-free tech-support numbers and fine support. TechWorks answered our call and our questions quickly — we weren't even put on hold to listen to elevator music. Although Asanté doesn't have a toll-free tech-support number, the staff returned our call promptly and answered our questions. Farallon also answered our questions, but it took us four calls — and a lot of Tony Orlando tunes — to get through.

On the dark side, David Systems' support technicians' lack of Mac knowledge left us hoping we wouldn't encounter any serious problems with the company's hub. Not only couldn't they answer our Mac-specific questions about interconnecting two David Systems hubs but they also didn't offer to call us back with an answer.

Product warranties are frequently an indication of how vendors think their products will stand the test of time. You couldn't expect much more in a warranty than the one TechWorks offers: It's the only vendor that provides a lifetime warranty. Eagle Technology, which markets Shiva hubs, and Asanté each have five-year warranties on materials and workmanship. NRC provides a three-year warranty, and Pivotal and David Systems offer two-year warranties.

The other vendors provide a one-year warranty, with one exception. CompuLAN simply guarantees that the 8000 TPC you buy "shall be free from defects at the time of purchase."

Hubba-Hubba-Hubba

Although LocalTalk may be adequate in certain network installations, it falters badly in a world of multimegabyte video, sound, color-scan, and desktop-publishing files. Ethernet, which boasts a maximum transmission rate of 10 megabits per second, is ideal for sending such sizable data files. In addition, it lays claim to broad acceptance and support in business, government, and higher education.

Switching to 10BASE-T Ethernet may sound as simple as running a wire out of your wall jack, but in most cases, it's far more complex. Once installed, however, a 10BASE-T hub as the center of a star topology provides greater reliability and simpler management than does the bus topology of thinnet and thicknet networks.

Despite a month of effort in the MacUser NetWorkShop to discover a significant performance difference among these 14 10BASE-T hubs, we couldn't uncover either a clear speed demon or a slug — the hubs performed equally well in all of our tests. Your purchase should be determined by whether you need a managed or nonmanaged hub and by pricing, product design and engineering, documentation, warranty, and technical support. Prices vary considerably, but price is not the only factor to consider — compare your choice with our top picks in "The Bottom Line."

Stefan B. Lipson is a *MacUser* associate editor.

The Bottom Line

Ethernet 10BASE-T hubs come in two flavors: managed, or smart, hubs and nonmanaged, or dumb, hubs. For those who need the convenience and power of a managed hub, we recommend the **NRC MultiGate Hub** ($3,495 list, $3,100 street). This 24-port powerhouse is elegantly engineered and has a good multifunction LED display. The MultiGate includes a three-year warranty, good documentation, and good technical support. In addition, it has a built-in bridge that can reduce your overall network utilization by repeating only the appropriate information onto the Ethernet backbone.

If a nonmanaged hub is all you need, you'll have a hard time choosing between the **Asanté 10T Hub/12** ($799 list, $458 street) and the **TechWorks HubWorks-8** ($399 list, $249 street). The 12-port 10T Hub/12 provides a removable faceplate so that you can attach either a single RJ-21 connector or 12 RJ-45 ports, and it has easy-to-set (but not easy to accidentally reset) DIP switches for configuring ports individually for use with pre-10BASE-T devices. LEDs show link and partition status for individual ports, including the AUI and BNC ports, and the hub has a five-year warranty.

The 8-port TechWorks HubWorks-8 is a low-cost, full-featured product with many of the same features as the Asanté hub. Its 10BASE-T ports are compatible with pre-10BASE-T devices, and the product also features a switchable port for connecting to another hub. Like the Asanté 10T Hub/12, the HubWorks-8 includes both a thicknet and a thinnet port. Its LED display offers a separate jabber LED for each port to tell you if your Ethernet card is misbehaving.

For management of large networks, we recommend the NRC MultiGate Hub (right). If you're looking for a good nonmanaged hub, you won't go wrong with either the Asanté 10T Hub/12 (top) or the TechWorks HubWorks-8 (bottom).

Table 1: Features of Nonmanaged 10BASE-T Hubs

● = yes ○ = no	 **Asanté** **10T Hub/8** $$$½	 **Asanté** **10T Hub/12** $$$$	 **Cabletron** **MR9T** $$$	 **Cabletron** **MRX** $$$½
List price	$399	$799	$695	$1,395
Street price	$264	$458	$695	$1,395
Price per port	$33	$38	$77	$116
Pros	Inexpensive. Small. Informative manuals. Five-year warranty.	Inexpensive. Small. Five-year warranty. Offers 12 RJ-45 or 1 RJ-25 port.	Small. Each port has traffic LED.	Two user-configurable ports. Rack-mountable. Each port has traffic LED.
Cons	No AUI port.		No AUI or BNC port.	Expensive. Noisy fan.
Hardware				
Number of 10BASE-T ports	8	12	9	12
Network-repeater chip	AMD	AT&T	LSI Logic/Cabletron	LSI Logic/Cabletron
AUI port	○	●	○	●*
BNC port	●	●	○	●*
Fiber-optic port	○	○	○	●*
Hierarchical port	●	●	●	○
WAN port	○	○	○	○
On/off switch	○	○	○	○
Auto-polarity adjustment	○	○	●	●
Pre-10BASE-T-compatible	○	●	○	○
Upgradable	○	○	○	●
Rack-mountable	○	○	○	●
Wall-mountable	●†	●	●†	●
Collision LEDs	○	●	●	●
Link-status LEDs	●	●	●	●
Number of LEDs	10	32	20	26
Power supply	external	external	external	internal
Other				
FCC certification	Class A	Class A	Class A	Class A
Dimensions (L x W x H)	8 x 4 x 1.5 in.	7.25 x 9.5 x 1.5 in.	7 x 4 x 1 in.	17 x 9 x 3.25 in.
Weight	4 lb	5 lb	1 lb	7 lb
Warranty	5 years	5 years	1 year	1 year
Company	Asanté Technologies, Inc. 404 Tasman Dr. Sunnyvale, CA 94089 800-662-9686 408-752-8388 408-734-4864 (fax)	Asanté Technologies, Inc. 404 Tasman Dr. Sunnyvale, CA 94089 800-662-9686 408-752-8388 408-734-4864 (fax)	Cabletron Systems, Inc. 35 Industrial Way Rochester, NH 03867 603-332-9400 603-335-3467 (fax)	Cabletron Systems, Inc. 35 Industrial Way Rochester, NH 03867 603-332-9400 603-335-3467 (fax)

*User-configurable.

†Mounts to the wall with Velcro straps rather than with metal brackets.

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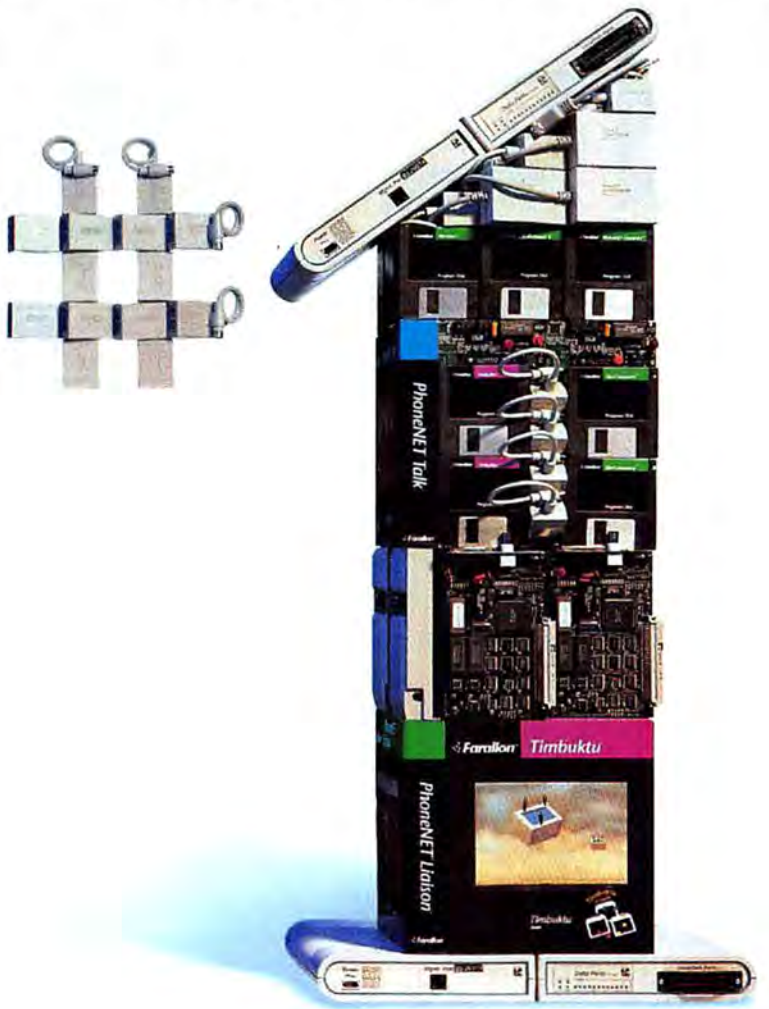

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Table 1: Features of Nonmanaged 10BASE-T Hubs, continued

● = yes ○ = no	 **CompuLAN** **8000 TPC** **ŧŧ**	 **David Systems** **VolksNet LAN** **ŧŧŧ½**	 **Dayna** **DaynaSTAR Hub-12** **ŧŧŧ½**	 **Dayna** **DaynaSTAR MiniHub** **ŧŧŧ**
List price	$699	$795	$995	$389
Street price	$699	$675	$712	$285
Price per port	$58	$56	$59	$36
Pros	Cascade port. Rack-mountable.	Informative LEDs and manuals.	Rack-mountable. Offers 12 RJ-45 or 1 RJ-21 port.	Inexpensive. Small.
Cons	No warranty.	Tech support unfamiliar with Mac.	Rack-mounting equipment not included. Awkwardly located LEDs. Noisy fan.	No AUI port.
Hardware				
Number of 10BASE-T ports	12	12[§]	12	8
Network-repeater chip	AT&T	David Systems	National Semiconductor	AMD
AUI port	●	● (optional)	●[◊]	○
BNC port	●	● (optional)	●[◊]	●
Fiber-optic port	○	● (optional)	○	○
Hierarchical port	●	●	○	○
WAN port	○	○	○	○
On/off switch	○	○	○	○
Auto-polarity adjustment	○	○	●	○
Pre-10BASE-T compatible	○	○	○	○
Upgradable	○	○	○	○
Rack-mountable	●	○	●	○
Wall-mountable	●	●	○	○
Collision LEDs	○	●	●	○
Link-status LEDs	●	●	●	●
Number of LEDs	55	32	31	10
Power supply	external	internal	internal	external
Other				
FCC certification	Class A	Class A	Class A	Class A
Dimensions (L x W x H)	17.25 x 10.25 x 2 in.	10.25 x 7.75 x 1.75 in.	9 x 17.5 x 2.25 in.	5.5 x 7.5 x 1.5 in.
Weight	9 lb	4 lb	5.5 lb	1.5 lb
Warranty	none	2 years	1 year	1 year
Company	CompuLAN 180 Charcot Ave. San Jose, CA 95131 800-486-8810 408-922-6888 408-954-8299 (fax)	David Systems, Inc. 701 E. Evelyn Ave. Sunnyvale, CA 94086 408-720-8000 408-720-1337 (fax)	Dayna Communications, Inc. 50 S. Main, 5th Floor Salt Lake City, UT 84144 801-531-0600 801-359-9135 (fax)	Dayna Communications, Inc. 50 S. Main, 5th Floor Salt Lake City, UT 84144 801-531-0600 801-359-9135 (fax)

[§]Optional 13th UTP port.

[◊]AUI and BNC ports cannot be used simultaneously.

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Table 1: Features of Nonmanaged 10BASE-T Hubs, continued

● = yes ○ = no	 **Digital** **DECrepeater 90T** $$$	 **Pivotal** **ModularHub** $$	 **Shiva/Eagle** **Hublet** $$$	 **TechWorks** **HubWorks-8** $$$$
List price	$1,590	$900	$299	$399
Street price	$1,590	$658	$254	$249
Price per port	$199	$55	$64	$31
Pros	Can be used as a stand-alone hub or as a module in a Digital concentrator. Toll-free tech support.	Upgradable. Toll-free tech support.	Inexpensive. Small. Five-year warranty.	Inexpensive. Lifetime warranty. Toll-free tech support. Informative manuals.
Cons	Very expensive. No AUI port.	Unreliable LEDs. No traffic LEDs. Uninformative manual.	No AUI or BNC port. Limited LEDs. No link-status LEDs. Uninformative manual.	Substandard case.
Hardware				
Number of 10BASE-T ports	8	12[§]	4	8
Network-repeater chip	Digital	AT&T	AMD	AMD
AUI port	○	●	○	●[◊]
BNC port	●	●	○	●[◊]
Fiber-optic port	○	○	○	○
Hierarchical port	○	●	●	●
WAN port	○	○	○	○
On/off switch	○	○	○	○
Auto-polarity adjustment	○	●	○	●
Pre-10BASE-T-compatible	○	○	○	●
Upgradable	○	●	○	○
Rack-mountable	○	○	○	○
Wall-mountable	●	●	●[†]	●
Collision LEDs	●	●	○	●
Link-status LEDs	●	●	○	●
Number of LEDs	11	16	2	26
Power supply	external	external	external	external
Other				
FCC certification	Class A	Class A	Class A	Class A
Dimensions (L x W x H)	11 x 5.25 x 1.25 in.	11 x 4 x 2 in.	5.75 x 3.5 x 1.25 in.	9.5 x 6.25 x 1.75 in.
Weight	1.75 lb	4.5 lb	.5 lb	1 lb
Warranty	1 year	2 years	5 years	lifetime
Company	Digital Equipment Corp. 146 Main St. Maynard, MA 01754 800-344-4825 508-486-5198 800-234-2298 (fax)	Pivotal Technologies, Inc. 100 W. Rincon Ave. Campbell, CA 95008 800-445-4628 408-374-7887 408-374-8074 (fax)	Eagle Technology Corp. 1160 Ridder Park Dr. San Jose, CA 95131 800-733-2453 408-441-7453 408-436-0348 (fax)	Technology Works, Inc. 4030 Braker Ln. W. Austin, TX 78759 800-688-7466 512-794-8533 512-794-8520 (fax)

[†]Mounts to the wall with Velcro straps rather than with metal brackets.

[§]Optional 13th UTP port.

[◊]AUI and BNC ports cannot be used simultaneously.

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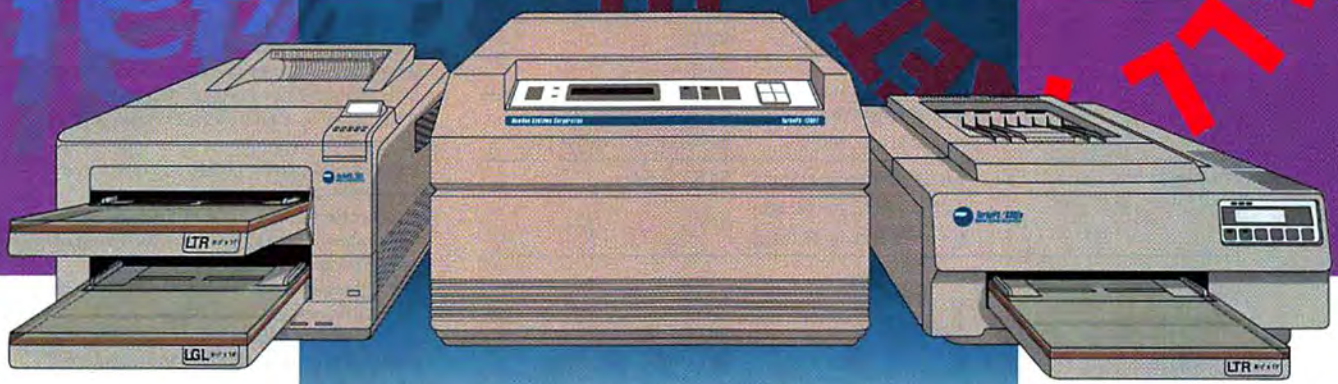

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Table 2: Features of Managed 10BASE-T Hubs

● = yes ○ = no	 Farallon PhoneNET StarController EN $$$½	 NRC MultiGate Hub $$$$
List price	$1,895	$3,495
Street price	$1,400	$3,100
Price per port	$117	$129
Pros	Good documentation. Can be used in concentrator.	Bridging capability. Rack-mountable. Informative LEDs.
Cons	In-band management requires LocalTalk StarController and bus connection. No BNC port.	No RJ-45 option.
Hardware		
Number of 10BASE-T ports	12	24
Network-repeater chip	David Systems	National Semiconductor/RTC
AUI port	●	●
BNC port	○	●
Fiber-optic port	○	optional
Built-in bridging	○	●
On/off switch	○	●
Auto-polarity adjustment	○	●
Pre-10BASE-T-compatible	●	●
Upgradable	○	●
Rack-mountable	○	●
Link-status LEDs	●	●
Number of LEDs	28	56
Power supply	external	internal
Management software	StarCommand 3.0	MultiGate Manager 3.1
Software features		
Graphical user interface	●	●
Password-protected access	●	●
In-band management	●*	●
Out-of-band management	●	●
Auto-partitioning	●	●
Per-port statistics	●	●
Other		
Length of management bus	up to 3,000 feet	unlimited with dial-up
FCC certification	Class A	Class A
Dimensions (L x W x H)	10.5 x 8.25 x 1.75 in.	19 x 13 x 1.75 in.
Weight	3.5 lb	7 lb
Warranty	1 year	3 years
Company	Farallon Computing, Inc. 2000 Powell St. Emeryville, CA 94608 510-596-9000 510-596-9020 (fax)	Network Resources Corp. 736 S. Hillview Dr. Milpitas, CA 95035 408-263-8100 408-263-8121 (fax)

*Only via LocalTalk connection.

Tables 1 and 2 Criteria

List price — The manufacturer's suggested retail price of the hub.
Street price — An average actual price of the hub as charged by a sample of dealers around the U.S. in May 1992.
Price per port — The street price divided by the number of 10BASE-T ports on the hub.
Number of 10BASE-T ports — The number of 10BASE-T ports on the hub.
Network-repeater chip — The manufacturer of the chip that retimes and retransmits all signals over the network.
AUI port — Does the hub have an AUI (attachment-unit interface) (thicknet) port?
BNC port — Does the hub have a BNC (thinnet) port?
Fiber-optic port — Does the hub have a fiber-optic port?
Hierarchical port — Does the hub have a separate (switchable) 10BASE-T port for connecting two hubs?
WAN port — Does the hub have a port for wide-area networking?
Auto-polarity adjustment — Can the hub identify reversed polarity of the 10BASE-T receive lines?
Pre-10BASE-T-compatible — Does the hub work with interface cards manufactured before publication of the IEEE's 10BASE-T specification?
Upgradable — Can the hub's performance be enhanced with the addition of SIMMs, SPIMs (single-purpose interface modules), SNMP cards, or ROM/software upgrades?
Rack-mountable — Can the hub be mounted in a standard 19-inch rack?
Wall-mountable — Can the hub be mounted on a wall?
Power supply — Whether the power supply is external or built in to the hub.
Management software — Software provided by the manufacturer that lets you configure and control the hub as well as monitor network activity from a Mac.
Password-protected access — Does the management software have the ability to prevent unauthorized users from configuring the hub?
In-band management — Can you use the management software from any Mac on your network?
Out-of-band management — Does the management software allow control of a dedicated port for hub management?
Auto-partitioning — Does the management software partition a port automatically if a collision threshold is passed?
Per-port statistics — Does the management software provide information about events on each port?
Length of management bus — The maximum line distance between the Mac and the hub.

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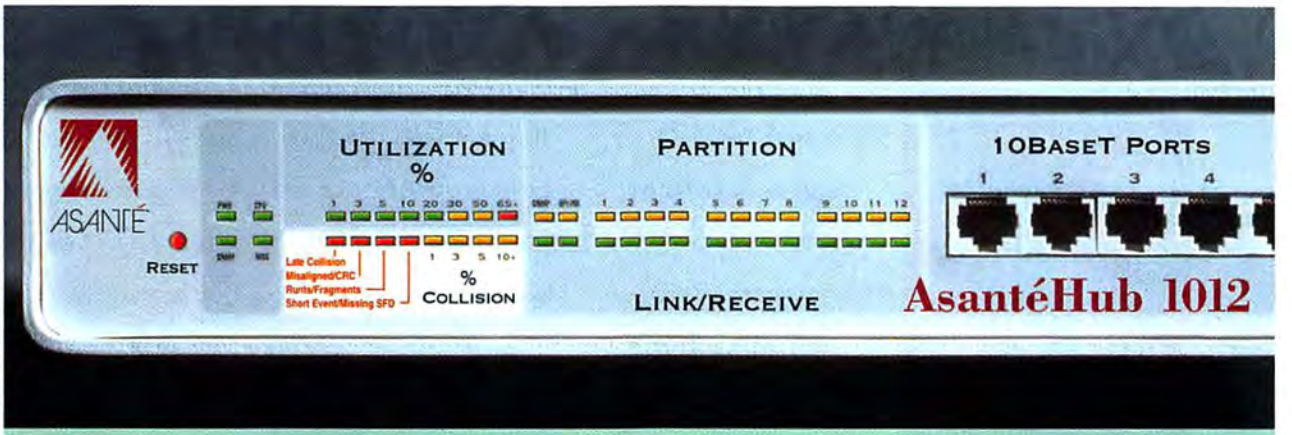

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The AsantéHub 1012™ is a 12-port, intelligent 10BaseT hub that offers all the features and benefits of a high-end enterprise hub for a departmental price.

Combining the AsantéHub 1012 and AsantéView™ management software creates the industry's first smart hub with both in-band (SNMP) and out-of-band network management for both PCs and Macs® that uses the same graphical user interface. That means you can graphically monitor and control your entire network, locally or remotely, from your choice of computer platform.

Smart Remote Network Management.

AsantéView gives you direct control of your network at the hub and port levels. The software can even trigger your pager to give you the flexibility to solve your office network problems when you're not there.

The AsantéHub includes a built-in expansion slot for internetworking option cards. Asanté offers an in-band SNMP hardware module as an option for this slot. The hub also features an RS-232 port for remote dial-up access, and both RJ-45 and RJ-21 connectors for direct-to-computer or punch-down block connections.

There is also a 3-in-1 "13th" port for interconnecting multiple hubs with backbone cabling. This port includes BNC, RJ-45 and AUI connectors supporting a variety of cabling media.

Asanté. The Smart Choice.

Asanté has built a reputation for producing compatible, reliable and flexible networking products. We offer a full family of Ethernet® and Token Ring adapter cards for PCs and Macs. And a full line of 10BaseT hubs. We're the networking company of choice because we give you more choices.

For more specific smart hub questions, please call us today at 800-523-3115.

Resellers: Asanté products are available from Ingram Micro, Merisel, and Tech Data.

[In-band or out-of-band network management from a Mac or PC, using the same graphical user interface.]

[3-in-1 auto-switching redundant backbone port with software override capability.]

[Remote out-of-band management lets you manage your network from anywhere in the world.]

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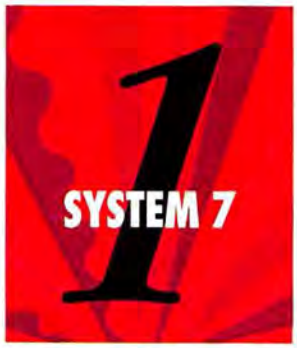
CIRCLE 83 ON READER SERVICE CARD.

7 REASONS WHY YOU NEED A NEW WORD PROCESSOR.



Because you're ready to see what System 7 can do.

Apple calls System 7 the biggest improvement in Macintosh since Macintosh. And WordPerfect® is now System 7 savvy.

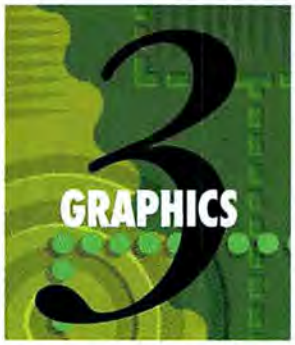
So now (among lots of other new things), WordPerfect will automatically keep track of changes that you (or someone else) might make to imported files (charts, graphics, whatever), and update your WP documents accordingly. Now, a change made in one place can be a change made in many places. Apple calls it "Publish and Subscribe," and it works between programs on your hard drive, as well as among people on your network. Publish and Subscribe assures you that your documents will always reflect the latest information available.

And it's just one of the new System 7 tricks that WordPerfect 2.1 has mastered.

Because WordPerfect does columns better than the Greeks.

Pick a starting point, click on the ruler, and see your text in two columns. Or in three columns. Or five columns. With vertical rules beside or between them, if you like. Drag a guide on the ruler and try *unequal* columns. Highlight text in a box that jumps across columns.

Go crazy with the design, or stick with the tried-and-true. The point is, WordPerfect gives you formatting options that other word processors don't. And exploring them couldn't be much easier.



Because you'd use more graphics if using them were easy.

WordPerfect not only gives you full control over the placement of graphics in your text, it also gives you a color drawing program for modifying imported artwork (or starting over from scratch) without ever leaving the program.

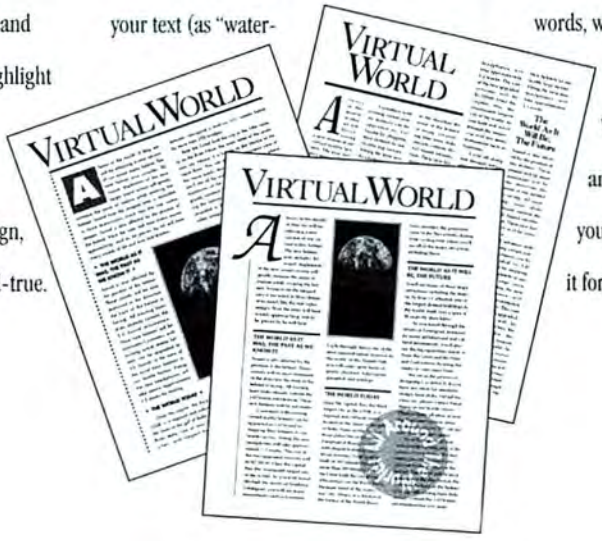
You can print graphics under your text (as "watermarks") or on top (as overlays).

You can use the drawing tools to rotate text to any angle that strikes your fancy (something many page-layout programs still can't do).

And WordPerfect gives you 36 border styles and 64 fill patterns — which you can use in any of 256 colors — for highlighting graphics, paragraphs, columns, pages, even blocks of text.

Because a movie is worth who-knows-how-many words.

If a picture is worth a thousand words, what's a movie worth? With WordPerfect and QuickTime, you can calculate it for yourself.



Apple's QuickTime is a new technology that lets you work with digital video and sound as easily as you now work with text and graphics files.

Imagine being able to place (and size) a QuickTime movie anywhere in a document. You could add urgency to a memo with a few well-chosen words delivered "live." Or help an audience visualize your latest brainstorm with a 3-D simulation they can start, stop and replay.

We have a feeling that words can't begin to describe all the ways you'll think of to use it.

Because you get tired of repeating yourself, yourself, yourself.

Perhaps because they've heard it's a powerful programming language, WordPerfect's macro editor intimidates some people at first. It shouldn't.

It's no more complicated than a tape recorder. Click "record" and it memorizes your keystrokes. Click "play" and it repeats them.

With no more knowledge than that, you can create a WordPerfect macro. And can spare yourself the effort of formatting M-E-M-O-R-A-N-D-U-M, T-o-:, F-r-o-m: (and so on) across the top of the page every time you want to fire off a memo, for example.

But simple as recording your own macros can be, we also ship a number of them with the program. For formatting addresses to print on envelopes. Placing "drop caps" at the start of paragraphs. And other jobs you'd rather not do twice.

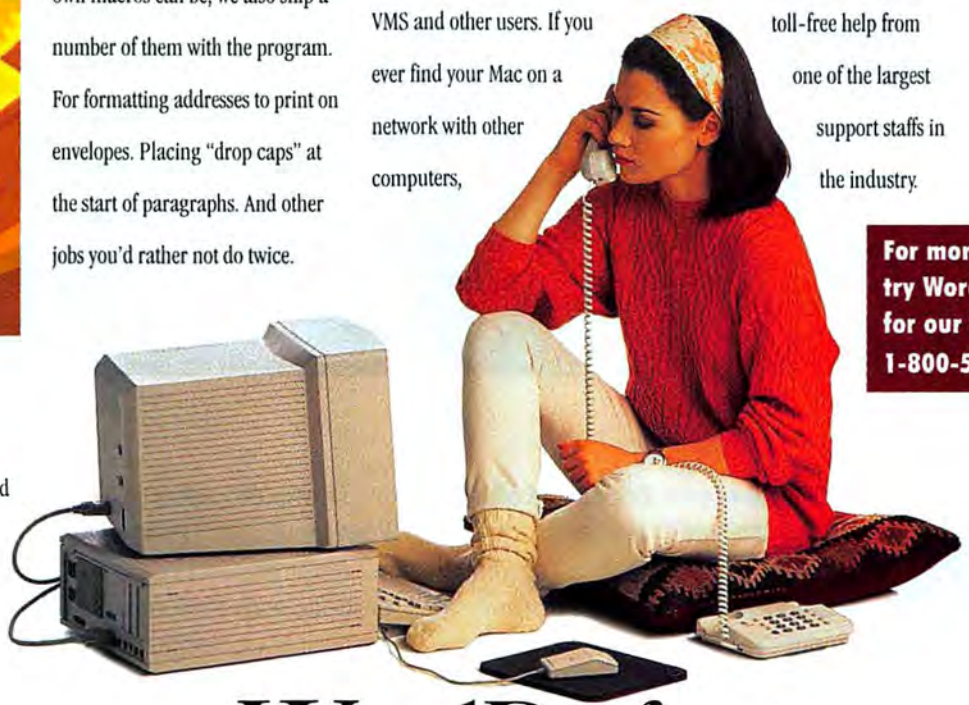
Because some people work on DOS computers.

You want the word processor that's right for you. If your choice happens also to be the choice of millions of others — with other computers — so much the better.

That's why WordPerfect is such a good choice. Lots of DOS users use WordPerfect. As well as UNIX, VMS and other users. If you ever find your Mac on a network with other computers, WordPerfect's compatibility can save you a lot of aggravation. Not to mention a lot of reformatting.

Because even if you never call us, it's nice to know we're here.

Like any good Mac program, WordPerfect 2.1 is easy to use. But unlike many Mac programs, you're not on your own with it. You get toll-free help from one of the largest support staffs in the industry.



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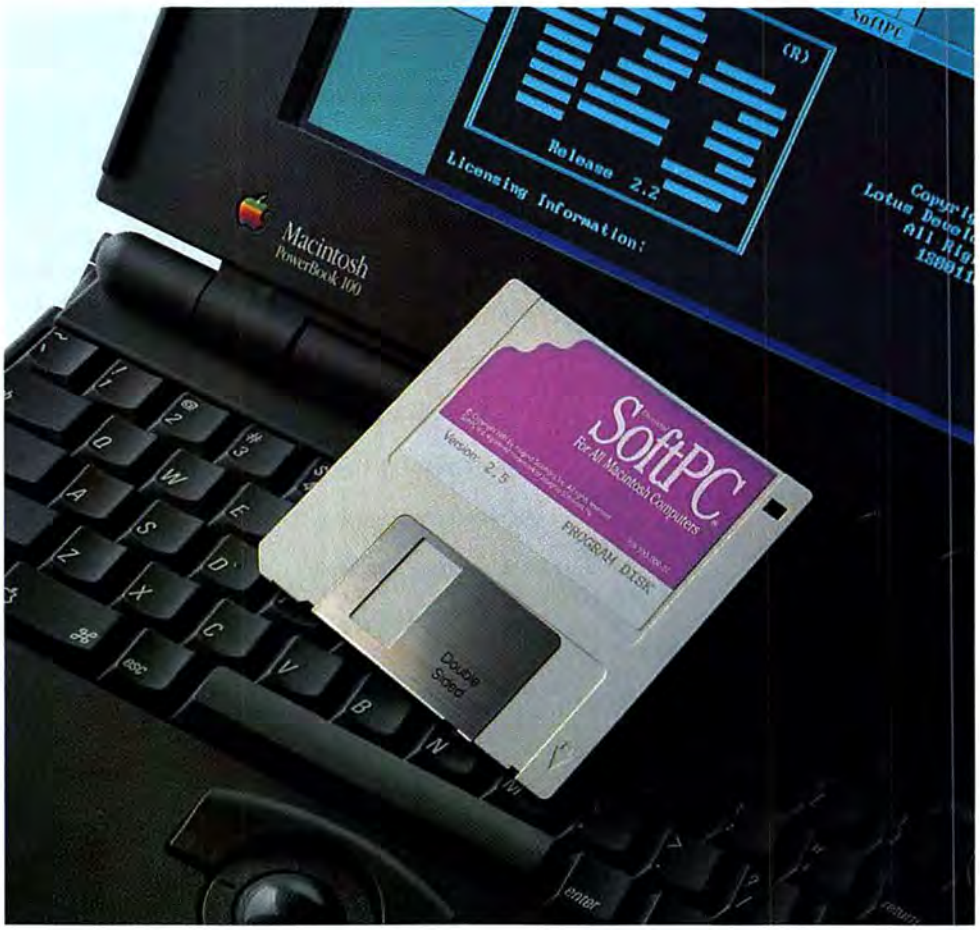

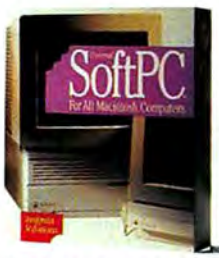

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CIRCLE 157 ON READER SERVICE CARD.

LocalTalking in LAN Land:

A Glossary

BY KAREN J. OHLSON AND AMANDA MICHAEL

If you sometimes find conversations about connectivity difficult to decipher, you're not alone. We compiled this glossary to give you a quick way to look up unfamiliar terms you may encounter while reading this Buyer's Guide — or while trying to network with your network-savvy acquaintances. We can't guarantee you'll be fluent in networkspeak after reading this, but at least there's enough here to give you a good start at faking it.

AFP (AppleTalk Filing Protocol): The *AppleTalk protocol* that specifies how data and applications on a file server are shared among users on a network.

AppleTalk: Apple's set of specifications for connecting computers and other devices to share information over *LANs* (*local-area networks*); it describes network hardware, software, and *protocols* and lets an assortment of Mac and non-Mac devices communicate over a variety of *transceivers* and communications media (most commonly *Ethernet* and *LocalTalk* media).

backbone: A central network that connects several other, usually lower-*bandwidth* networks, so those networks can pass data to each other. The backbone network is usually composed of a high-capacity communications medium, such as *fiber-optic* or thick *coaxial cable.*

bandwidth: The information-carrying capacity of a communications system, generally measured in the number of bps (bits per second) the system can transmit. The higher the bandwidth of a system, the more information it can carry per second; for example, *FDDI* (*Fiber Distributed Data Interface*) systems have a capacity of 100 megabits per second, which is about 400 times the capacity of *LocalTalk* (230.4 kilobits per second).

bridge: A device that connects two or more same-protocol network segments so that devices on these segments can communicate with each other. The bridge ascertains how to pass *packets* between segments based on *node*-address information, on filtering criteria established by the network manager, or on both types of information.

bus: In a network, a single, shared communications link (often a linear run of cable) that connects all *nodes.* Although all network devices have equal access to messages broadcast along the bus, each device listens for only the messages directed to its unique address.

Chooser: A Mac DA that allows users to select and use networked devices such as file servers and printers.

coaxial cable: An electrical cable consisting of a wire surrounded by a cylindrical conductor, both of which have the same axis, or center. Because the cylindrical conductor acts as a shield, signals

ILLUSTRATION: TIM CARROLL

carried on a coaxial cable don't affect nearby electrical components and any interference from these components doesn't affect the signals carried on the cable. *Thicknet* and *thinnet* are two examples of coaxial cable.

concentrator: A chassis that can house multiple network devices such as *hubs* and *routers* and that provides an application for managing the devices.

connectivity: The passing of information (data or commands) between two or more computers, using any method that works (for example, a network, a modem connection, or a floppy disk carried between computers).

CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance): A scheme for controlling network traffic that allows any of multiple *nodes* to send information over a shared network cable if the cable is free. It avoids collisions by having all nodes signal their intention to transmit before transmitting. If two nodes send intention-to-transmit messages at the same time, both nodes wait for random amounts of time before trying again.

CSMA/CD (Carrier Sense Multiple Access with Collision Detection): A scheme for controlling network traffic that allows multiple *nodes* to send information over a shared network cable if the cable is free. It handles collisions, which occur if two nodes transmit at the same time, by having both nodes wait for random amounts of time before retransmitting their messages.

DECnet/DNA: A series of network communications *protocols* defined by Digital Equipment Corp. and its line of products that implement the protocols. DECnet is the product line, which is compatible with *Ethernet* and a wide range of systems; DNA (Digital Network Architecture) contains the protocol definitions.

DOS (disk-operating system): As a generic term, any operating system loaded from disks when the system is started or rebooted. Commonly used to refer to MS-DOS (Microsoft's disk-operating system) or PC-DOS (IBM's version of Microsoft's DOS), a single-tasking, single-user operating system with a command-line interface, primarily used on IBM and IBM-compatible PCs.

Ethernet: A media-access specification for local-area networks, developed by IEEE (the Institute of Electrical and Electronics Engineers) and known as the IEEE 802.3 specification. It defines *transceivers* and a 10-megabit-per-second communications *protocol* as well as a cabling scheme that uses thick or thin *coaxial cable* or *twisted-pair cable*. Ethernet networks generally use either a *bus* network *topology* (with coaxial cable) or a *star topology* (with twisted-pair cable).

Ethernet cable: Cable that meets the specifications for the types of cable that can be used on an *Ethernet* network (thick or thin *coaxial cable* or *twisted-pair* cable, for example).

EtherTalk: Apple's low-level *protocol* for transmitting *AppleTalk* protocols over *Ethernet* media.

FDDI (Fiber Distributed Data Interface): A specification developed by ANSI (the American National Standards Institute) for transmitting data at a rate of 100 megabits per second over *fiber-optic cabling* in *token-ring* networks. The FDDI II extension of this standard provides specifications for real-time transmission of analog data (such as voice and video) in digitized form.

fiber-optic cabling: A type of network cabling composed of thin glass or plastic fibers that transmit information in the form of light pulses. Fiber-optic cables can transmit many channels of information at high rates and are immune to electromagnetic interference.

gateway: A device or program that connects two *LANs* (*local-area networks*) that use different *protocols* and translates between these protocols, allowing devices on the two networks to communicate with each other.

hub: A device that extends the maximum physical length of a network by cleaning and retransmitting signals among network segments. A hub provides the central connecting point in a *star* network *topology*. Also called a multiport repeater.

internet: Two or more networks that have similar or dissimilar *protocols*, connected by *gateways* or *routers*.

interoperability: The ability to exchange information in a network that contains computers and additional devices that have dissimilar operating systems or *protocols*.

LAN (local-area network): A group of connected, intercommunicating computers and shared peripheral devices residing within a limited geographic area, such as a city block or a single building.

LocalTalk: Apple's low-level *protocol* for transmitting *AppleTalk* packets over a 230.4-kbps cabling system. Apple's connectors and cabling for this system are also called LocalTalk — they were originally called AppleTalk; Apple renamed the hardware in June 1989 and reserved the term *AppleTalk* to refer more generally to its system of networking protocols.

MAU (media-attachment unit): A transceiver that connects to the AUI (attachment-unit interface) port on an *Ethernet* interface card and provides attachments to some type of data-communications medium (such as *UTP* [*unshielded twisted-pair*] or *fiber-optic cables*).

network: A group of computers and peripheral devices, such as printers, that are interconnected so they can communicate with each other. A network also includes the hardware products, such as cables that connect the devices, and the software that allows them to communicate.

network-interface card: In Mac networking, an add-in card or external box that connects a computer to an *Ethernet* network.

node: Any device on a network that can independently send or receive information and that has a network address; also the point at which the device is linked to the network.

OCE (Open Collaboration Environment): A set of extensions to System 7 that will make E-mail and messaging capabilities available throughout the Mac environment. It will provide store-and-forward services in three key areas: messaging and mail; directory services; and authentication, privacy, and digital signatures.

packet: A chunk of data bundled with source and destination addresses so it can be transmitted over a network. Generally, a data file must be broken into many packets by the network device that's transmitting before it can be sent (so it won't monopolize the network) and then must be reassembled when it reaches its destination.

PC (personal computer): Any computer that fits on a desk and is designed to

meet the needs of a single user; the term *PC* generally refers to a DOS-compatible machine.

peer-to-peer: Interaction in which computers and other network devices communicate with each other as equals and on their own initiative (as opposed to a host/terminal situation).

PostScript: Adobe Systems' page-description language, which has very flexible font capabilities. PostScript commands can describe a complex text or graphic image for printing or, in some cases, for display on a monitor.

print queue: A sequence or list of documents waiting to be printed, generally maintained by a *print spooler* or *print server.*

print server: A computer, with appropriate software, that accepts print jobs from multiple users on a network, holds them in a queue, and sends them to one or more networked printers as they become available. The software part of a print server is essentially a *print spooler,* except that it spools print jobs for multiple users instead of only one.

print spooler: Software that intercepts a user's print job and sends it to disk or memory, where it waits for a printer to become available. Because the print job is diverted, it doesn't tie up computing resources; the user can begin another task. A print spooler can also be installed on a separate computer, called a *print server,* in which case it can handle print jobs for several users at the same time.

protocol: A set of rules that governs network communications. Low-level protocols define transmission rates, data-encoding schemes, physical interfaces, network-addressing schemes, and the method by which *nodes* contend for the chance to transmit data over the network. High-level protocols define functions such as printing and file sharing.

repeater: See *hub.*

ring: See *token ring.*

router: A device that connects two or more networks and determines the most efficient route for passing data through an internet. Multiprotocol routers can handle this job for two or more protocols simultaneously.

shielded cable: Cable in which the signal-carrying wire is enclosed by an outer sheath to reduce the effects of electromagnetic interference on the signals. The shielding also reduces the effects of these signals on nearby electrical components and helps to prevent electronic eavesdropping.

star: A network *topology* in which nodes are connected to a single, central *hub* rather than to each other, forming a star-shaped configuration. If the hub is an intelligent device that controls the nodes' access to the network, the star topology is called active; when the hub is only a wiring connector, it's called passive.

TCP/IP (Transmission Control Protocol/Internet Protocol)**:** A set of communications *protocols* developed by the U.S. Department of Defense that are designed to let many networks interconnect. Because many companies have built TCP/IP protocols in to their UNIX devices, these protocols have become associated with UNIX. Universities and research organizations often use TCP/IP protocols in their networks.

10BASE-5: A specification for running *Ethernet* on thick *coaxial cable,* which allows a signal to be carried as far as 500 meters before requiring a *repeater.* Cable that meets this specification is often referred to as *thicknet.*

10BASE-T: A specification for running *Ethernet* on *unshielded twisted-pair cable* (telephone-style wiring), which allows a signal to be carried as far as 100 meters before requiring a *repeater.* Cable that meets this specification is often referred to as 10BASE-T cable.

10BASE-2: A specification for running *Ethernet* on thin *coaxial cable,* which allows a signal to be carried as far as 200 meters before requiring a *repeater.* Cable that meets this specification is often referred to as *thinnet.*

thick Ethernet cable (thicknet)**:** *Coaxial cable* with electrical characteristics that meet the 10BASE-5 specification for *Ethernet* networks. It allows a signal to be carried as far as 500 meters before requiring a repeater. Also called 10BASE-5 cable.

thin Ethernet cable (thinnet)**:** *Coaxial cable* with electrical characteristics that meet the 10BASE-2 specification for *Ethernet* networks. It allows a signal to be carried as far as 200 meters before requiring a repeater. Also called 10BASE-2 cable or cheapernet.

throughput: A measure of the data-transfer rate in a communications system (such as a network) or a measure of a computer's data-processing rate.

token passing: A network-access method that uses a special bit pattern called a token that gives permission to *nodes* to transmit data, one node at a time. Each node is allowed to transmit a message only when it has the token; if a node has no messages to transmit when it receives the token, it will pass the token to the next node.

token ring: A networked ring of devices that passes a special bit pattern called a token from *node* to node to decide which device can transmit data on the network.

topology: The physical (or sometimes logical) layout of the cables, *nodes,* devices, connections, and pathways in a network. Some common network topologies are *bus, ring,* and *star.*

transceiver: A transmitter/receiver — a device that can simultaneously transmit and receive network signals across two cable types.

twisted-pair cable: Cable that consists of two insulated wires twisted around each other (and sometimes wrapped in additional insulation) to help shield their signals from electromagnetic noise. Twisted-pair cable is often used in telephone wires; it also serves as the transmission medium in some *LANs* (*local-area networks*) (see also *10BASE-T*).

unshielded cable: Cable in which the signal-carrying wire or circuit isn't shielded to keep out electromagnetic noise that can potentially damage the data stream.

UTP (unshielded twisted-pair cable)**:** Twisted-pair cable in which the two insulated wires that twist around each other are not surrounded by additional insulation.

WAN (wide-area network)**:** A group of computer networks connected over long distances, often by telephone lines and satellite transmission.

Windows: A windows-based graphical user interface from Microsoft that runs on top of the DOS operating system and requires software written specifically to take advantage of its features (which include mouse input and pull-down menus).

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White Knight has been designed with one ultimate goal - to get the job done with a minimum of fiddling. It offers the kind of power associated with products costing hundreds of dollars more, but is easier to learn and more flexible. Even the user interface is customizable to an extraordinary degree. There's no more searching for the "perfect" program because you set it up the way you want it. A FREE copy of Okyto (a revolutionary Mac-to-Mac file transfer program) is included with each White Knight package.

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Alisa Systems
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818-792-9474
AlisaShare (10 users), $1,500
AlisaShare (unlimited users), $4,700

Apple Computer
20525 Mariani Avenue
Cupertino, CA 95014
800-776-2333
408-996-1010
AppleShare Server 3.0, $1,199
Macintosh PC Exchange, $79

Argosy Software, Inc.
113 Spring Street
Fifth Floor
New York, NY 10012
212-274-1199
RunPC, $445
RunPC Remote, $219
Software Bridge/Mac, $159

Asanté Technologies, Inc.
404 Tasman Drive
Sunnyvale, CA 94089
800-662-9686
408-752-8388
10T Hub/8, $399
10T Hub/12, $799
1012 Intelligent Hub, $1,999
SNMP Card, $399

Banyan Systems, Inc.
120 Flanders Road
Westboro, MA 01582
508-898-1000
VINES (5 users), $1,295
VINES (10 users), $2,495
VINES (20 users), $3,995
VINES (unlimited users), $7,495
VINES Option For Macintosh, $1,995

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35 Industrial Way
Rochester, NH 03867
603-332-9400
MR9T, $695
MRX, $1,395

Cayman Systems
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Cambridge, MA 02139
617-494-1999
GatorShare-CS, $1,995
GatorShare-GX, $1,995

CE Software
1801 Industrial Circle
West Des Moines, IA 50265
800-523-7638
515-224-1995
QuickMail (5 users), $399
QuickMail (10 users), $599
QuickMail (50 users), $2,499
QuickMail (100 users), $4,699

Codenoll Technology Corp.
1086 N. Broadway
Yonkers, NY 10701
914-965-6300
CodeNet-9550, $3,995
CodeNet-9553, $4,995
CodeNet-9750, $3,495

CompuLAN
180 Charcot Avenue
San Jose, CA 95131
800-486-8810
408-922-6888
8000 TPC, $699

Compumation, Inc.
820 N. University Drive
State College, PA 16803
800-776-6537
814-238-2120
Print Central 2.0, $795

CoOperative Printing Solutions, Inc.
5950 Live Oak Parkway
Suite 175
Norcross, GA 30093
404-840-0810
PServe 3.0, $1,095

DataViz, Inc.
55 Corporate Drive
Trumbull, CT 06611
800-733-0030
203-268-0030
MacLinkPlus-PC, $199
MacLinkPlus-Translator, $169

David Systems
701 E. Evelyn Avenue
Sunnyvale, CA 94088
408-720-8000
VolksNet LAN, $795

Dayna Communications, Inc.
50 S. Main
Suite 530
Salt Lake City, UT 84144
800-531-0600
801-531-0600
Dayna STAR Hub-12, $995
Dayna STAR MiniHub, $389
DOS Mounter, $89.95

DayStar Digital, Inc.
5556 Atlanta Highway
Flowery Branch, GA 30542
800-962-2077
404-967-2077
LT200 Connection PC Interface Board, $249

Digital Equipment Corp.
146 Main Street
Maynard, MA 01754
800-344-4825
508-493-5111
DECrepeater 90T, $1,590
PATHWORKS Client License, $308

Eagle Technology
1160 Ridder Park Drive
San Jose, CA 95131
800-733-2453
408-441-7453
Hublet, $299

Farallon Computing, Inc.
2000 Powell Street
Emeryville, CA 94608
510-596-9000
Farallon Concentrator, $2,990
PhoneNET StarController EN Series 500, $1,895
PhoneNET Talk, $195

Information Presentation Technologies, Inc.
555 Chorro Street
San Luis Obispo, CA 93405
800-223-9993
805-541-3000
uShare (1 user), $295
uShare (5 users), $895
uShare (unlimited users), $1,395

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800-848-7677
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Access PC 2.0, $99.95
Entry Level SoftPC, $199
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SoftAT, $499

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Cambridge, MA 02142
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617-577-8500
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cc:Mail (100 users), $3,295
cc:Mail Macintosh Platform Pack, $495

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Suite A320
Scottsdale, AZ 85251
800-624-6107
602-277-0900
Word for Word Macintosh, $149

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One Microsoft Way
Redmond, WA 98052
800-426-9400
206-882-8080
LAN Manager Server for Macintosh, $995
Microsoft Mail AppleTalk 3.0 Server, $395

Motorola
300 Knightsbridge Parkway
Lincolnshire, IL 60069
708-913-1215
ARDIS

Network Resources Corp.
736 S. Hillview Drive
Milpitas, CA 95035
408-263-8100
MultiGate Hub, $3,495
MultiGate Hub-2, $5,995

Novell, Inc.
122 E. 1700 South
Provo, UT 84606
800-453-1267
801-429-7000
NetWare (5 users), $495
NetWare (20 users), $895
NetWare (100 users), $1,995

Orange Micro, Inc.
1400 N. Lakeview Avenue
Anaheim, CA 92807
714-779-2772
Orange 386 20sx, $2,199
Orange 386 25sx, $2,199

Pacer Software, Inc.
7911 Herschel Avenue
Suite 402
La Jolla, CA 92037
619-454-0565
PacerShare (5 sessions), $1,200

Pivotal Technologies, Inc.
100 W. Rincon Avenue
Suite 211
Campbell, CA 95008
800-445-4628
408-374-7887
ModularHub, $900

Shiva Corp.
One Cambridge Center
Cambridge, MA 02142
800-458-3550
617-252-6300
Hublet, $299

Symantec Corp.
10201 Torre Avenue
Cupertino, CA 95014
800-441-7234
408-253-9600
Bedrock

Systems Compatibility Corp.
401 N. Wabash
Suite 600
Chicago, IL 60611
312-329-0700
Software Bridge/DOS, $149

Technology Works, Inc.
4030 Braker Lane W.
Suite 350
Austin, TX 78759
800-688-7466
512-794-8533
HubWorks-8, $399

Traveling Software
18702 North Creek Parkway
Bothell, WA 98011
800-662-2652
206-483-8088
LapLink Mac III, $149.95

Tribe Computer Works
1195 Park Avenue
Suite 211
Emeryville, CA 94608
510-547-3874
LocalSwitch, $39.95

Tutankhamon Electronics, Inc.
2446 Estand Way
Pleasant Hill, CA 94523
510-682-6510
MagicNet MH400, $475
MagicNet MH800, $899
MagicNet MH1600, $1,695

Table 1: Who Makes It?

Product	Company
8000 TPC	CompuLAN
Access PC	Insignia Solutions
AlisaShare	Alisa Systems
AppleShare Server	Apple Computer
ARDIS	Motorola
Bedrock	Symantec
cc:Mail	Lotus Development
CodeNet-9550	Codenoll Technology
CodeNet-9553	Codenoll Technology
CodeNet-9750	Codenoll Technology
Dayna STAR Hub-12	Dayna Communications
Dayna STAR MiniHub	Dayna Communications
DECrepeater 90T	Digital Equipment
DOS Mounter	Dayna Communications
Entry Level SoftPC	Insignia Solutions
Farallon Concentrator	Farallon Computing
GatorShare-CS	Cayman Systems
GatorShare-GX	Cayman Systems
Hublet	Eagle Technology, Shiva
HubWorks-8	Technology Works
LAN Manager Server for Macintosh	Microsoft
LapLink Mac III	Traveling Software
LocalSwitch	Tribe Computer Works
LT200 Connection PC Interface Board	DayStar Digital
Macintosh PC Exchange	Apple Computer
MacLinkPlus	DataViz
MagicNet MH400	Tutankhamon Electronics
MagicNet MH800	Tutankhamon Electronics
MagicNet MH1600	Tutankhamon Electronics
Microsoft Mail	Microsoft
ModularHub	Pivotal Technologies
MR9T	Cabletron Systems
MRX	Cabletron Systems
MultiGate Hub	Network Resources
MultiGate Hub-2	Network Resources
NetWare	Novell
Orange 386 20sx	Orange Micro
Orange 386 25sx	Orange Micro
PacerShare	Pacer Software
PATHWORKS	Digital Equipment
PhoneNET Star Controller	Farallon Computing
PhoneNET Talk	Farallon Computing
Print Central 2.0	Compumation
PServe	CoOperative Printing Solutions
QuickMail	CE Software
RunPC	Argosy Software
RunPC Remote	Argosy Software
SNMP Card	Asanté Technologies
SoftAT	Insignia Solutions
SoftPC	Insignia Solutions
Software Bridge/DOS	Systems Compatibility
Software Bridge/Mac	Argosy Software
10T Hub/8	Asanté Technologies
10T Hub/12	Asanté Technologies
1012 Intelligent Hub	Asanté Technologies
uShare	Information Presentation Technologies
VINES	Banyan Systems
VolksNet LAN	David Systems
Word for Word Macintosh	Mastersoft

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The PLI Arrays will transfer data at up to 20MB per second—twelve times faster than a MacII fx. And we've got a whole family of Arrays to choose from!

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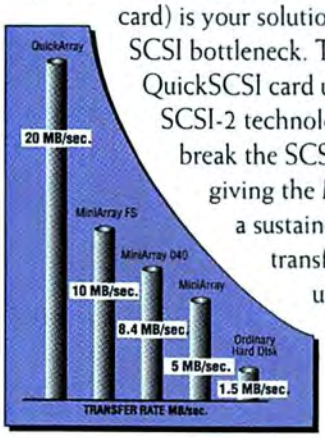

If you own a Quadra 900 or 950, the MiniArray 040 was designed just for you. The MiniArray 040 uses both built-in SCSI-2 channels. This multi-channeling gives sustained transfer rates of up to 8.4MB per second on a Quadra 950.

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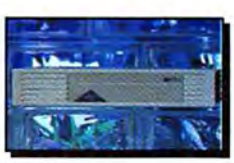
QuickArray

MiniArray FS

MiniArray 040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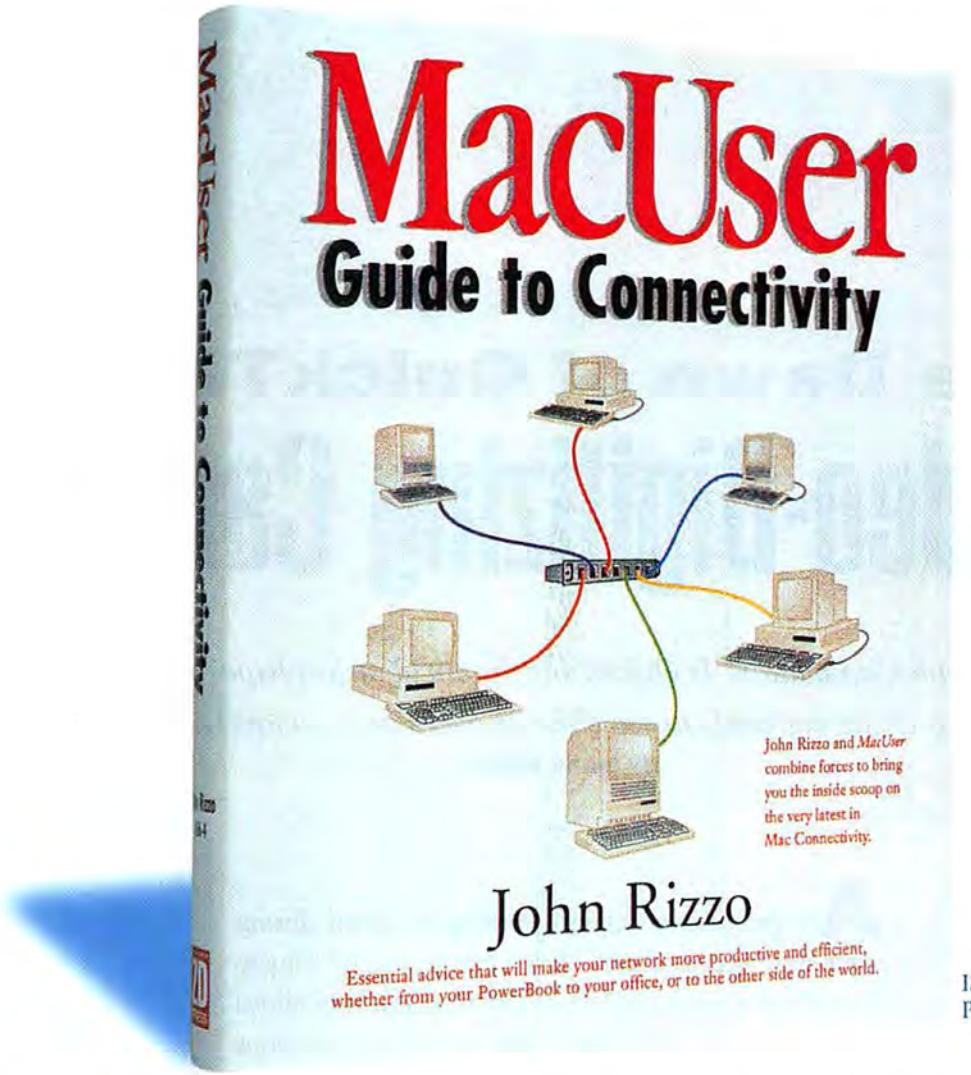

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The Dawn of QuickTime: Video-Digitizing Cards

Video, sound, animation! Is QuickTime practical or just hype? We look at 12 video-digitizing cards to see if the answer comes in loud and clear.

BY MARK FROST

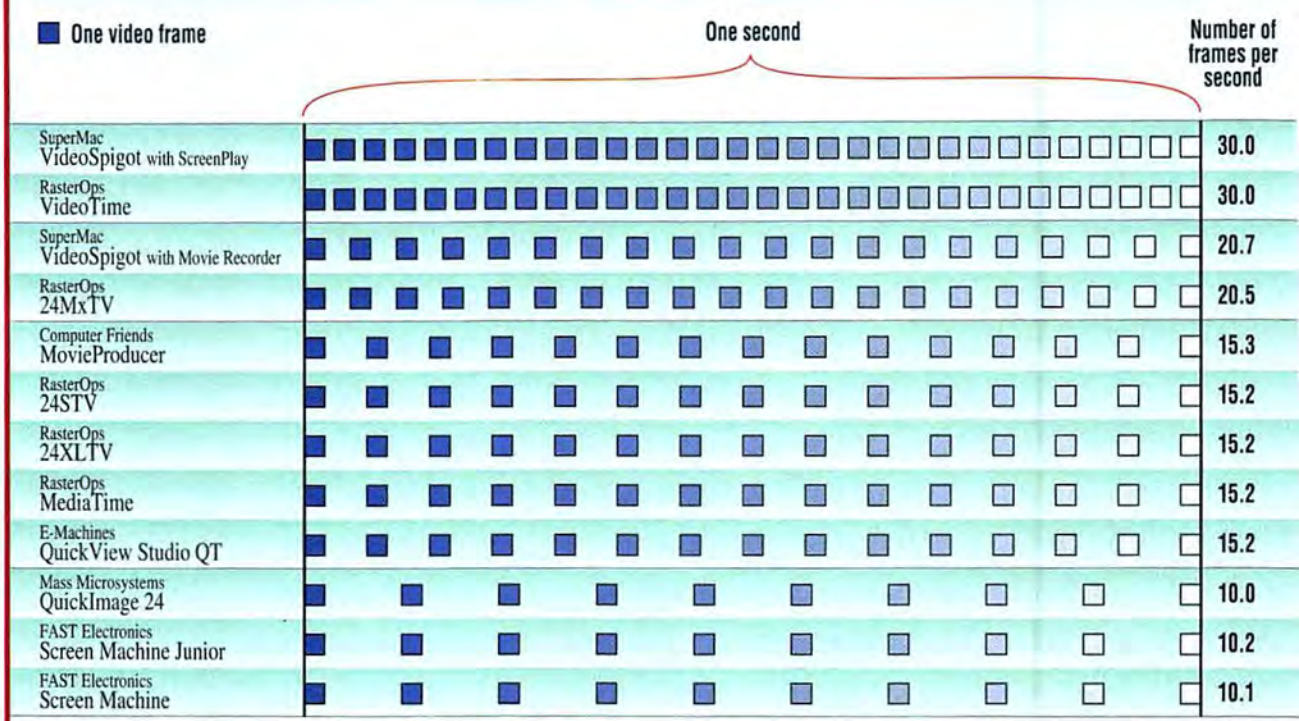
Are prospective clients starting to yawn during your slide presentations? Even before lunch? Maybe the old sales pitch has lost its zip. Besides, your slides are deteriorating and you've sworn you'll rip out your hair if you blow one more projector bulb. You've heard the new presentation battle cries: "Multimedia! QuickTime!" The answer to your presentation problems seems just a purchase order away — but is it really that easy?

Everything from sound to animation and video can now be piped through your Mac via applications that speak Apple's new standard for time-based data: QuickTime. But don't expect cinemascope — today's QuickTime movies more closely resemble jerky postage stamps than fluid full-screen video. Although its true promise awaits more-powerful hardware and software, even today's QuickTime technology opens the door to a whole new world of communication.

PHOTOGRAPHY: TOM UPTON

Buy, Buy, Buy!

Figure 1: Frame Rates — Not Quite Up to Speed



Just as desktop publishing revolutionized the print industry, multimedia is poised to do the same for all those messages that just can't sit still. The *M* word — *multimedia* — has been thrown around a lot in the past few years, but few understand what it really means: the melding of traditional methods of static communication — text, graphics, charts, and still images — with dynamic methods such as sound, animation, and video (see the "What Is Multimedia?" sidebar). To get a handle on what it's like to create a multimedia presentation, this month MacUser Labs focuses on importing video and sound into your Macintosh and the hardware that makes it possible.

Wherefore Art Thou Video?

Today, the two best ways to stuff video images into your Mac are to use collections of stock video clips on CD-ROMs or video signals from a camcorder or VCR captured through a video-digitizing card. CD-ROMs such as The Image Bank CD Collection Footage, Volume One, provided with DiVA's VideoShop editing software, make it easy for you to copy and paste dozens of QuickTime video, animation, and sound clips into any QuickTime-compatible application. Importing video from a VCR, VDP (videodisc player), or camcorder, on the other hand, requires a bigger investment: a video-digitizing card and video-capture software.

For this report, MacUser Labs looked at 12 video-digitizing cards. Six of the cards — the inexpensive SuperMac VideoSpigot and Mass Microsystems QuickImage 24, the midrange Computer Friends MovieProducer (the ColorSnap 32+ card bundled with DiVA's VideoShop), and the $1,000+ RasterOps VideoTime and FAST Electronics Screen Machine and Screen Machine Junior — simply digitize video signals from a VCR, VDP, or camcorder. The E-Machines QuickView Studio QT offers both video and sound capture, whereas the RasterOps 24MxTV, 24STV, and 24XLTV and the SuperMac VideoSpigot Pro offer video capture along with the ability to drive a range of Macintosh video displays (see Table 1 for information on monitor-support capabilities). The RasterOps MediaTime can do it all — video and sound capture as well as display-card capability.

Each card comes with software that allows you to capture still-video frames. The FAST Electronics Screen Machine and the RasterOps VideoTime and the cards that function as Mac display cards can turn your Mac screen into a television by letting you view full-screen, full-motion video on your Mac monitor.

This report focuses on each card's ability to display a small window of

Figure 1: Video-digitizing cards that can capture high frame rates produce video clips that have smooth, seamless motion. In this figure, the boxes represent video frames; the more frames per second, the less abrupt the change from frame to frame and the smoother the motion. To ascertain each card's maximum frame rate, we installed each one in a Quadra 700 with 20 megabytes of RAM and captured a 30-second (160 x 120 pixel) video sequence from a videodisc player. Because a great deal of background motion in a video sequence complicates compression, thus reducing the frame rate, we used a simple "talking head" image with a stationary background. The SuperMac VideoSpigot (used with SuperMac's ScreenPlay software) and the RasterOps VideoTime captured an impressive 30 fps. Most of the other cards captured 15 fps or less — the standard playback rate of most 68030-based Macs.

digitized video on your Mac screen and to save a *QuickTime movie* file of the video images, either to RAM or to your hard disk. All the cards we examined were NuBus cards that came with *Vdig* software — system extensions that work with the QuickTime extension (which some of the cards do not include) to tell a QuickTime-aware application that a video-digitizing card is installed and what controls (on the card) are available.

You also need a video-capture application to drive your card. All but the E-Machines QuickView Studio QT and the Mass Microsystems QuickImage 24 include QuickTime video-capture software. To capture QuickTime movies with the other cards, you need a capture application such as Apple's Movie Recorder, which comes with the QuickTime Starter Kit. The Computer Friends MovieProducer comes with DiVA's VideoShop, and both of the SuperMac VideoSpigots come with Adobe's Premiere — applications that let you edit and combine QuickTime movies.

What Took 'Em So Long?

People have been watching full-motion video images for the better part of 40 years and have been staring into computer screens for about 10, so what's taken the brainiacs so long to put the two together? Well, it's not as easy as it sounds. In analog video — such as that played on your home TV or VCR — three major broadcast standards determine how images are displayed: NTSC in the U.S. and Japan; PAL in Australia and most of Europe; and SECAM in France, Eastern Europe, and the former Soviet Union.

Converting an analog signal into a digital signal isn't as complicated as it sounds, but transferring that video data to storage or screen is an intense task. Video-digitizing cards do nothing but convert analog video into digital form. The Mac's processor is then responsible for pushing the enormous stream of digital-video data from the card to either the screen or storage. When you play back your stored digital-video clips, your Mac decompresses the data as necessary and sends it directly to your screen — no special hardware is required for playback.

But even then, the amount of video data being pushed through the Mac is too great for it to handle. So the Mac, through QuickTime, shrinks the video image to a small size (160 x 120 pixels) to reduce the amount of video data required for each frame of video. Full-screen (640 x 480 pixels) can require as much as 900K of pixel data per frame, whereas a 160-x-120-pixel window requires only 57K per frame.

QuickTime also provides users with a variety of compressors for specific types of files — still images, video, animation, and so on. These compressors allow you to reduce your QuickTime clips' file size, which can get enormous (the average uncompressed file size of our 30-second test clip was 16 megabytes).

The compressors employ *spatial*

Hours Till Showtime

Is digital video worth the time and expense? Do presentations containing QuickTime video and animations really convey information in an effective and memorable manner? To find out, MacUser Labs created a professional presentation and showed it to a group of seasoned media handlers. The results were interesting — and encouraging for QuickTime evangelists.

We enlisted the help of Henri Poole and Kathleen Egge, of Spatial Data Architects, San Francisco, and Brooks Cole and Syndee Collison, of Ad Agency in a Can, Corte Madera, California. We asked them to take our test client's existing sales presentation, which was on thirty 11-x-17-inch cardboard panels that contained text, photographs, and graphics, and convert it into a multimedia presentation for display on an active-matrix color LCD panel. We supplied them with previously filmed video images as well as new clips filmed with a hand-held camcorder. We also asked them to spice up the original graphics and text with animations.

Working with our consultants, we realized very quickly that producing such a presentation required a powerful Mac with plenty of RAM and a large hard drive, so we provided them with a Quadra 700 with 20 megabytes of RAM and a 1-gigabyte hard drive.

Once the presentation had been completed, we showed it to a jury of people who commonly give or receive similar presentations. These observers almost unanimously felt that the presentation's QuickTime elements best held their attention. However, they also said the visual gymnastics sometimes distracted them from the content.

For most of the jury, the small size of the video windows (the standard QuickTime 160 x 120 pixels) was a significant drawback. But at the top of the list of things our jury suggested be improved was QuickTime's often jerky motion — higher frame rates and large video windows are clearly needed.

Perhaps the most important lesson we learned — aside from the fact that creating multimedia presentations is a complex process — is that maybe we could produce much more powerful presentations if we were to rethink the whole

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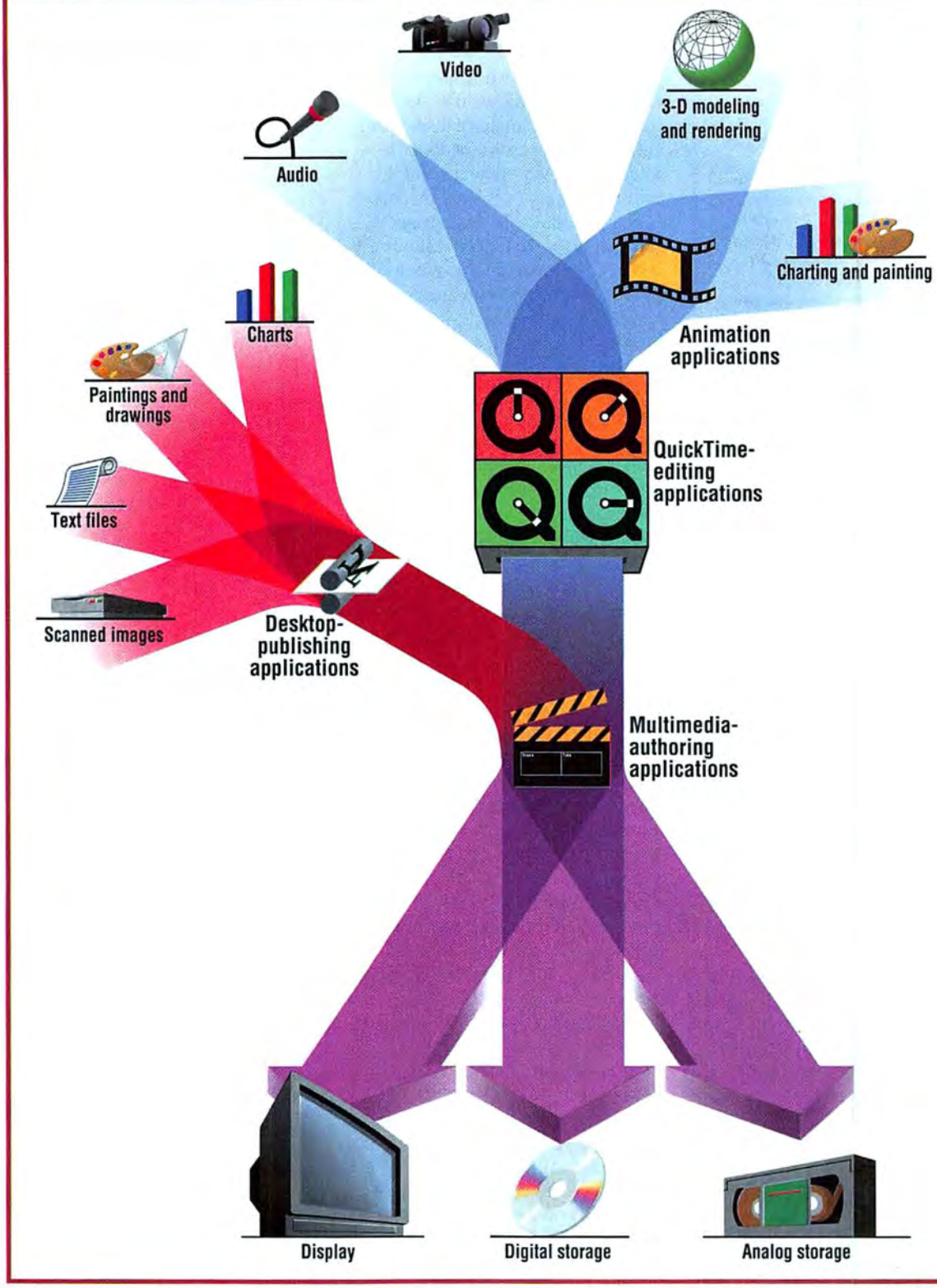
What Is Multimedia?



Today, most of the files on your Mac — text, spreadsheets, databases, charts, images — are *static*. The Macintosh's first revolutionary contribution to personal computing, desktop publishing, brought all these static elements together.

The second revolution has been heralded for years but is only now gaining steam. *Dynamic* time-based files such as sound, animation, and video have been on the Mac for some time. Until QuickTime, however, there hasn't been a file standard for dynamic data and it's been virtually impossible to copy and paste dynamic files into other programs.

Multimedia applications provide the ability to combine static and dynamic files — text, graphics, video, animation, and sound — into one file. Aldus' Persuasion, Microsoft's PowerPoint, Interactive Solutions' MovieWorks, Macromedia's Action, and Educational Multimedia Concepts' MacPresents are early entries in the growing field of *multimedia-authoring* applications.

With desktop publishing, the result is usually a printed page, but with multimedia, the result is a computer-generated slide show, a user-controlled kiosk, or a videotape — to name just a few. The likely forms of these presentations are either direct display of the image from a computer, digital storage (such as a CD-ROM), or analog storage (such as a videotape).

compression to reduce the file size of each individual frame and *temporal* compression to reduce the amount of data repeated across a group of frames. Compression ratios vary greatly, depending on the video's contents. Clips with little motion benefit more from temporal compression, because much of the background image stays the same.

QuickTime does whatever is necessary to ensure that the sound and image elements of a QuickTime movie begin and end together, no matter what Mac the movie is played on. If the Mac can't keep all the elements synchronized, QuickTime will skip video frames to try to keep up with the sound. The result is often choppy video that falls in and out of sync with the accompanying sound.

Lights, Camera, . . .

Installing a NuBus card isn't always easy. Unfortunately, some of the manuals included with the video-digitizing cards fail to make the installation process any easier.

Both of the FAST Electronics Screen Machines we tested came with thick manuals that, at first glance, appeared to be very well organized. But a closer look revealed that the documentation was so vague as to make it almost useless in places. Frequent calls to technical support were required to get answers to basic questions.

The instructions for the E-Machines QuickView Studio QT were greatly oversimplified. Installation was broken down into a five-step process, yet the manual gave little detail about any of the steps. Furthermore, after reading the manual, we discovered that the card would not function unless a video-display card that supported 16-bit color had been installed — might this be an attempt by E-Machines to encourage you to buy its 16-bit video-display card?

The instructions for the Computer Friends MovieProducer were brief and lacked diagrams but had all the right information. The SuperMac Video-Spigot instructions were clear and

Showtime, continued

method of presentation. For example, one of our jurors wondered why we kept the presenter (our test client's sales director provided a running commentary with the multimedia presentation). This juror would have preferred getting an interactive version of the presentation that he could have browsed through at his leisure and followed up on with an eye-to-eye meeting. Clearly, simply incorporating moving images into standard presentations is only a tiny step in the direction of effective multimedia: We have to think much harder about the ways we like to receive information and how we can best keep the attention of viewers.

Step 1: Scan Images
8 hours

We scanned all 30 panels in 24-bit color at 72 dpi, reducing the image size to 640 x 480 pixels. We then cropped the images and converted them into PICT format.

Step 2: Shoot Video
6 hours

A script was written and filming took place with a Hi-8 video camera. The camera had no speaker and came without an earphone for monitoring the sound quality, so unfortunately, background sound made almost all the original footage unusable. This problem wasn't discovered until after we'd finished shooting. We were forced to shoot the footage all over again.

Step 3: Select Video Clips
3 hours

We reviewed all of our video clips and took notes on the contents of each clip, which tape it was on, and its location on the tape. This catalog saved us a lot of time once we had decided which clips to use.

Step 4: Digitize Video Clips
5 hours

After we had selected the appropriate video clips, we digitized each one. We then played the clips on our LCD panel and discovered that although smoothness of motion was preserved, the clips were far too pale. We redigitized each clip, increasing the saturation and reducing the brightness levels of all the clips so that they looked their best

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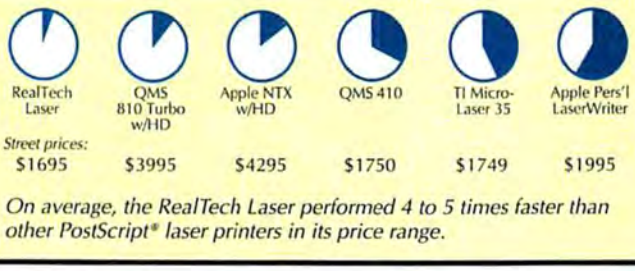
DARE TO COMPARE.



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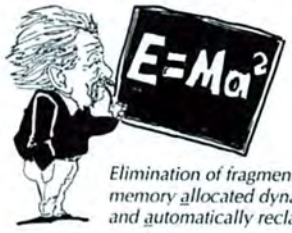

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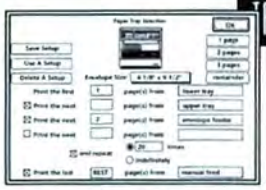

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	9 ppm 8.5x11	4 ppm 8.5x11	6 ppm 8.5x11	9 ppm 8.5x11	8 ppm 8.5x11
	Optional 2nd paper tray	—	Optional 2nd paper tray	Optional 2nd paper tray	Optional 2nd tray
	300 dpi	300 dpi	300 dpi	300 dpi	300 dpi
	SCSI port	—	—	Optional SCSI port	SCSI port
	2 mb RAM (+8)	3 mb (+1)	2 mb (+3)	2.5 mb (+8)	2 mb (+2)
	PostScript Level 2	PS Level 2	PS Level 2	PS Level 2	PS Level 1
Cons	Only available through HARDWARE THAT FITS 1-800-364-USER	No SCSI port 4 ppm Only expandable to 4 mb RAM No 2nd paper tray	No SCSI port 6 ppm Only expandable to 5 mb RAM	Expensive options Daughter board design Upgradable to 10.5 mb, but not all memory usable for PS	Pricey 8 ppm Only expandable to 2 mb RAM

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You Can Be Fooled

Your eyes are playing tricks on you. As you can see here, one image clearly looks better than the other — its colors are brighter and richer. Why, then, did we label it Bad and the obviously inferior image Good? Because the image on the left, even though it looks better as a *single frame,* is part of a clip that was captured at 15 fps whereas the image on the right is part of a clip that was captured at 30 fps.

OK, so it wasn't a fair question — but we're a magazine, not a QuickTime video clip. But how important is the relationship between frame rate and image quality?

To find out, we captured the same clip at 10, 15, and 30 fps with one of the digitizing cards. We then showed the resulting clips to our discerning — but human — MacUser Labs staff. They almost unanimously agreed that the 30-fps clip had the best *image quality,* even though all three clips had been captured with the same card. Smoothness of motion, the obvious visual result of higher frame rates, is an important factor in the perception of overall image quality.

We also discovered that an even greater influence on the perception of image quality is *sound.* We captured the same clip again at 15 fps, with four sound variations — one with no sound, one with 11-kilohertz mono sound, one with 22-kilohertz mono sound, and one with 44-kilohertz stereo sound (the higher the number, the higher the sampling rate and the higher the quality of the sound). All four clips were placed on the screen simultaneously, and all sound was played back through the Mac's speaker.

When we showed these clips to our labs staff, a full 80 percent felt that the clip with the 22-kilohertz sound *looked* best. (The 44-kilohertz sound was played back as 22-kilohertz mono through the Mac's speaker, but it was not as clear as the sound recorded at 22-kilohertz.) No one felt that the clip without sound had the best image quality.

The implications are clear: Although image quality may be important as a starting point, high frame rates and high-quality sound can mask mediocre single-frame image quality.

Bad

Good

Figure A: When is bad good and good bad? The perceived image quality depends on a video clip's frame rate.

concise, with an introduction to the basics of QuickTime and digital video. The instructions also included a very useful glossary.

With the exception of the 24MxTV, which came with only a software manual, all the RasterOps cards had excellent documentation, which also included glossaries. Installation of the RasterOps MediaTime board proved problematic, because the lower connector on the card bumped against the opening in the back of our Quadra 700 (the same problem occurred with the IIci and IIcx). We found that it sometimes took two or three reboots to get a monitor attached to the MediaTime to light up, because of this poor connection.

Each card ships with software for capturing single frames of still video. All but the E-Machines QuickView Studio QT and the Mass Microsystems QuickImage 24 ship with QuickTime-video-capture applications — the E-Machines QuickView Studio QT application could capture video clips but not in QuickTime format.

One of the more disturbing discoveries we made when installing these cards was that only the Mass Microsystems QuickImage 24 was certified as Class B by the FCC. The two FAST Electronics Screen Machines had no FCC certification at all, and the remainder were FCC Class A only. According to the FCC, Class A requirements are less stringent than Class B: Class A products should not be used in a residential environment, because they may interfere with radio and television reception.

It's very likely that digitizing cards priced below $1,000 will find their way into homes across the country. Manufacturers of those cards should get the proper certification, because residential users of Class A devices can be forced to stop using them if they interfere with neighbors' reception — a real possibility in today's

thin-walled apartment buildings.

Installation usually means a call or two to technical support — and our case was no exception. To get an idea of what kind of response you can expect from each of the vendors, we installed each card per their instructions, except for one simple error that any tech-support representative should have been able to handle: We left the Vdig component at the root level of the boot volume instead of in the System Folder, where it belongs. To find out how average buyers are treated, we didn't identify ourselves as MacUser Labs and we used an untraceable phone number.

The Computer Friends, E-Machines, Mass Microsystems, and RasterOps tech-support representatives were very systematic, guiding us through a series of carefully designed questions until they solved our problem — within 15 minutes, including hold time. FAST Electronics representatives were apparently out of the office the week we conducted this test, and we reached an answering machine — and none of our calls were returned by the end of testing.

SuperMac's tech support was busy and offered to call us back. After five hours, we tried again and asked to hold. After holding for nine minutes, we reached a tech-support representative who was unable to solve our problem — his opinion was that there was something wrong with the card and suggested we take it back to the dealer.

Mediocre Image Quality

Although somewhat tricky, installation was easy compared with capturing a quality image with most of the cards. Most offer controls for correcting color, brightness, and contrast problems — and some really needed them. However, we also discovered that the perception of image quality is determined by the rate at which the video is captured: The higher the capture rate, the better the perceived image quality (see the "You Can Be Fooled" sidebar).

Although image controls are handy — they let you adjust the image before you capture it by showing you the results of your adjustments in the QuickTime-capture program's preview window — using them is also very time-consuming. Different settings are often required for each scene, because different colors need adjustment; the best cards are those that provide images requiring little or no adjustment.

Using Apple's Movie Recorder application, from the QuickTime Starter Kit, we captured a 160-x-120-pixel, 30-second clip from videodisc. We then compared the same video frame from all the digitized clips to discover the default image quality of each card.

The Mass Microsystems QuickImage 24 produced the worst single-frame image quality, with vertical bands of blue and green dominating the left third of the image. The E-Machines QuickView Studio QT's image had a yellow tint throughout and was so bright that the image became washed out.

Images from the FAST Electronics Screen Machine and Screen Machine Junior looked washed out. Both Screen Machines also caused a series of pale vertical lines to appear on the left side of the Mac's display, outside the video-capture window. Beyond this, both cards often defaulted to a European PAL signal when preparing to capture a new clip. To get around this, we frequently had to quit and restart the capture application and sometimes even reboot the Mac.

All the RasterOps cards provided images with faint vertical bands. Colors appeared accurate but a little dull. The SuperMac VideoSpigot's images and those of the VideoSpigot Pro seemed slightly muted. The Computer Friends MovieProducer captured vibrant, well-saturated colors, but the image was *pixelated*, or blocky.

Speedy = Smooth

The rate at which video data is captured is frequently referred to as the *frame rate*, and it is measured in fps (frames per second). An *NTSC*

Showtime, continued

on the LCD panel. Once we were satisfied with the clips' image quality, we used Apple's Movie Player, from the QuickTime Starter Kit, to crop the clips.

Step 5: Meet with Consultants

6 hours

We held a kickoff meeting with our consultants to generate a project plan. We described our goal for the presentation, and they offered suggestions on possible methods of creating it. We decided that they would create a modified slide presentation, using Aldus Persuasion 2.1, incorporating the video elements we had already created and animations they would create themselves. We then handed over the hardware and all the files, including the scanned images of the panels and the digitized video clips.

Step 6: Create New Images

2 hours

We decided that the scanned panels were unusable, because of poor color and type quality. We salvaged the photographic elements from the scanned panels but decided to recreate the other elements within Persuasion. Aside from improving quality, this would make all the text editable.

Step 7: Build Templates

2 hours

We created a set of auto-templates in Persuasion by copying the layout of the original boards.

Step 8: Import PICTs and Create Layers

6 hours

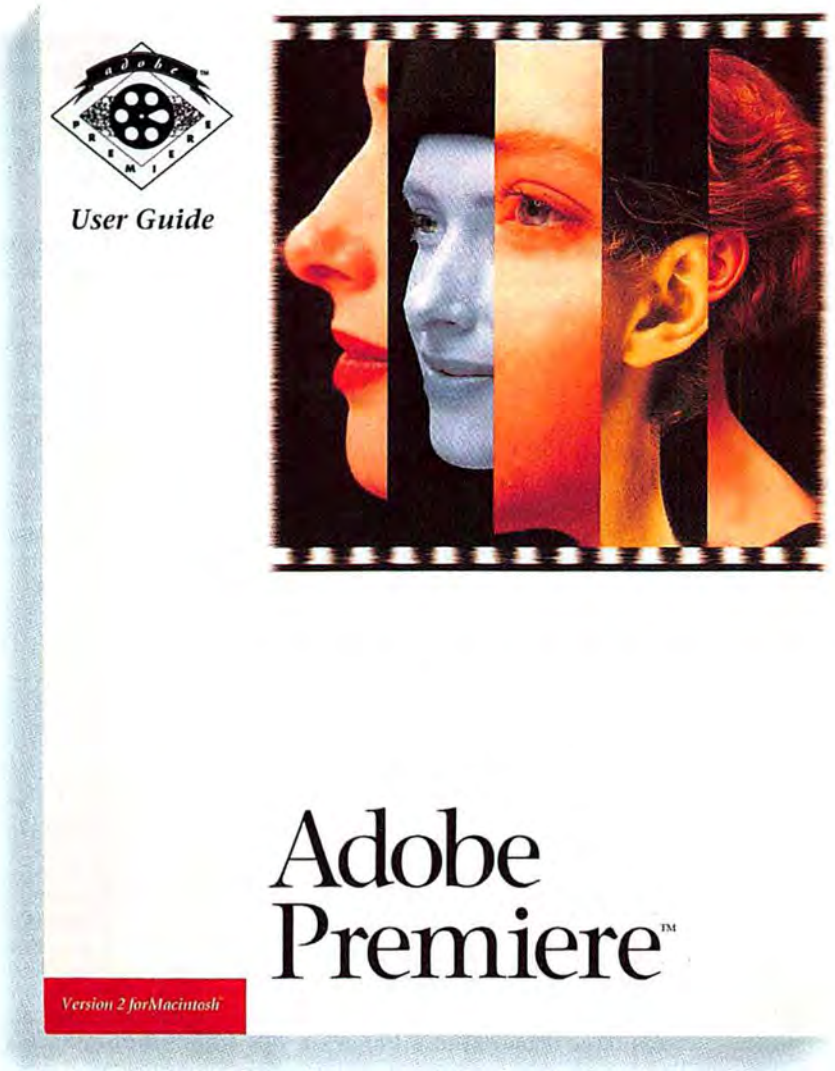
We imported all the salvaged photographic elements and constructed layers to hold all the elements of each slide.

Step 9: Layerize and Enter Text

16 hours

We reentered all the text in the appropriate layers in Persuasion. We found that the layer that was last modified became layer 1 on each slide, so each change we made meant reorganizing all the slide's layers to ensure that they played back in the correct order.

(continues)



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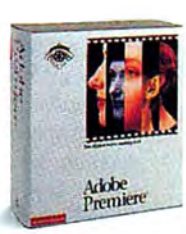

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CIRCLE 67 ON READER SERVICE CARD.

On the Horizon

With most new technologies, second-generation products tend to overshadow their predecessors. This may be the case with video-digitizing cards. Our top picks in this report can't capture anything like full-screen, full-motion video, but they may be useful for educating us about the use of video, leaving it to future products to give us the high-quality results we look forward to.

For example, New Video's EyeQ, which began shipping in July, offers full-screen, full-motion video with CD-quality stereo sound. New Video offers two products: the EyeQ playback system ($2,495) and the EyeQ authoring system ($4,495). Each consists of a card containing Intel's i750 video-processing chip, which provides high-performance compression and decompression. The authoring system lets you create full-screen videos, and the playback product is designed simply for playback. New Video, 1526 Cloverfield Blvd., Santa Monica, CA 90404; 310-449-7000.

SuperMac Technology has introduced two new products — one is a high-performance *codec* (compressor/decompressor) that works with its VideoSpigot products and allows high frame rates at larger window sizes, and the other is an altogether new video digitizer that's called the Digital Film.

The new codec enables VideoSpigots to record and play back larger-sized video clips at much higher frame rates. The Digital Film offers 24-bit-color display on 13-inch monitors and can digitize full-screen, 30-fps video and stereo sound. The card/daughtercard combo uses on-board compression to keep frame rates high. It will ship with Adobe Premiere 2.0 QuickTime-editing software. The new version of Premiere includes support for SMPTE time code, device control, direct-capture capability, and the ability to create edit-decision lists, among other features. A "lite" version of Premiere 2.0 will be shipped with the VideoSpigot products. The cost of the Digital Film is expected to be around $4,000. SuperMac Technology, 485 Potrero Avenue, Sunnyvale, CA 94086; 800-334-3005 or 408-245-2202.

RasterOps recently announced a new RISC-based daughtercard that attaches to the 24MxTV, 24STV, 24XTLV, or VideoTime card and allows greater capture frame rates and larger video windows. RasterOps, 2500 Walsh Avenue, Santa Clara, CA 95051; 800-729-2656 or 408-562-4200.

Radius has released a new card called the VideoVision that functions as

The SuperMac Digital Film card/daughtercard promises to offer broadcast-quality, full-frame, 30-fps video-capture, playback, and print-to-video capabilities. It is expected to come bundled with the Adobe Premiere 2.0 QuickTime-capture and -editing program.

(National Television Standards Committee) color-video signal — your average day-to-day color-TV signal in the U.S. — consists of 29.97 fps (often referred to as 30 fps). Recording at high frame rates makes motion appear smooth, but unfortunately, it also makes files big.

Most of the digitizers we tested couldn't capture at 29.97 fps, because they couldn't convert the analog signal fast enough. The majority of Macs can't play back at that rate either, because they can't move the enormous amounts of video data off the disk or out to the screen fast enough.

To get as close as possible to the magic 29.97-fps standard, Apple recommends that you use a fast Macintosh to speed image compression and decompression, capture in 16-bit color so that less video data has to be processed, and disconnect the Macintosh from your network to reduce the chance of data-stream interruption.

The SuperMac VideoSpigot and the RasterOps VideoTime and 24MxTV are designed to capture video at 29.97 fps. To achieve this rate, however, you need a powerful Mac (a Quadra 700 or faster) with a fast hard drive — and even then you can reach 29.97 fps only when capturing 160-x-120-pixel images.

Even if you manage to reach the vaunted 29.97 fps when capturing, don't expect to play back your clip at anywhere near that rate if you play it back on a slower machine. We were able to capture 29.97 fps on a Quadra 700 with a VideoSpigot, using SuperMac's ScreenPlay application, and with a RasterOps VideoTime, using Apple's Movie Recorder application — but playback rates dropped to 6 to 15 fps, depending on the Mac used for playback.

If you are capturing video on a Quadra for playback on a Quadra, 29.97 fps will give you the highest-quality results. If you will be playing your video back on lesser machines, however, constrain your capture rate to about 15 fps to reduce the clip's file size, because most other Macs can't play back any faster. If you're capturing on a Macintosh other than a Quadra, don't bother to constrain your video-capture rate, because you'll probably be capturing at less than 15 fps anyway.

The E-Machines QuickView Studio QT, the Computer Friends MovieProducer, and the RasterOps 24STV, 24XLTV, and MediaTime all capture a maximum of 15 fps. A SuperMac VideoSpigot (used with SuperMac's Vdig component and Apple's Movie Recorder) and a RasterOps 24MxTV can each capture approximately 20 fps. The Mass Microsystems QuickImage 24 and the FAST Electronics

both a digitizer and an encoder. The card comes with a breakout box that allows multiple inputs as well as standard NTSC output. The VideoVision outputs a relatively clean analog signal, allowing you to print your QuickTime movies to videotape, and contains expansion slots that can accept compression cards to increase screen-capture size and speed. Radius is bundling DiVA's VideoShop editing software and Macromedia's Action with the VideoVision. The entire package is priced at $2,399. Radius, 1710 Fortune Drive, San Jose, CA 95131; 408-434-1010.

In the near future, look for new products that will embrace the *MPEG* (Moving Picture Experts Group) compression standard. This standard outlines a more efficient algorithm for compressing video than does Apple's video compressor and may eventually enable the Mac to digitize, edit, and play back broadcast-quality video. AT&T Microelectronics is already producing a chip set that can do MPEG compression. Because the standard has yet to be widely embraced, it may be some time before digitizers have on-board MPEG compression, but when they do, desktop video as a means of broadcast-quality editing may become a reality.

Screen Machine and Screen Machine Junior can each capture no more than 10 fps.

One Frame at a Time

All the cards do have a capacity for *controlled capture:* The card captures a frame; the source device advances to the next frame, which is then digitized; and so on. This type of capturing requires not only a special capture application but also a video-source device with a serial port through which it can be controlled.

The advantage of controlled capture is that cards that cannot capture 30 fps in real time, even at 160 x 120 pixels, can capture 30 fps at much larger window sizes with controlled capture, because the card can take as much time as it needs to digitize each frame before moving to the next.

For instance, Truevision's NuVista+ has a QuickTime-compatible Vdig component, but in our testing, it could capture only 8 fps. The NuVista+ offers much higher image quality and control than the other cards do, however, so although it may not be suited for real-time digitizing, it might be good for controlled captures.

Most Digitizers Are Deaf

Just like high frame rates, sound quality proves crucial to the overall perception of image quality (see the "You Can Be Fooled" sidebar). After scrutinizing our clips for image quality and frame rates, we then captured the same video clips with sound, using a Macintosh that had an internal microphone jack. Because the Mac's internal microphone has no volume control, sound recorded through it is loud and correspondingly distorted. To get decent sound with this method, we had to use Adobe Premiere editing software, which came with the VideoSpigots, to lower the volume and reduce the sound distortion after the clips had been digitized.

Using the Quadra 900's built-in sound-input lines caused another problem — often the sound could not be heard when played back on other Mac models. The line inputs of the Quadra 900 and 950 are amplified, so when sound recorded through these inputs is played back on other Macs, it's often too quiet to be heard.

For those using NuBus Macs that don't have internal microphones (the IIfx and IIci), SuperMac is now offering a bundle called VideoSpigot and Sound, which comprises a VideoSpigot and a Macromedia MacRecorder with SoundEdit Pro software. We found that Macromedia's MacRecorder provided adequate sound on Macs that lacked internal microphones, but on Macs with microphones, particularly Quadras, the sound became scratchy.

The E-Machines QuickView Studio QT and the RasterOps MediaTime cards offered the highest-quality sound capture of all. The QuickView uses an optional daughtercard for sound capture, whereas the MediaTime's sound

Showtime, continued

Step 10: Create New QuickTime Clips
15 hours

We used Macromedia's Director to create most of the animated graphic elements. Some airbrushed art elements and text required antialiasing in Photoshop before being imported into Director. We took other elements directly from Persuasion and imported them into Director to create animations. We also animated FontMonger and Infini-D objects in Director.

We then converted all the Director animations into QuickTime movies, using Apple's Movie Converter application, from the QuickTime Starter Kit.

Step 11: Integrate QuickTime Movies
4 hours

Movies created in the previous step and those provided in step 4 were placed in their appropriate layers in Persuasion. During this process, we discovered that Persuasion occasionally fails to display the last few frames of QuickTime movies, so some graphs didn't fully display all their information.

Step 12: Review Presentation
6 hours

We reviewed the presentation and noted changes for each slide.

Step 13: Make Corrections
20 hours

We corrected spelling mistakes, along with alignment problems, and removed extra layers that were not used. Once we had made all the changes, we had to review each slide — a tedious step — because the order of layers had changed, depending on which layers were last modified. Hindsight: It would have been easier to create each layer as a separate slide, thereby eliminating the problems related to reordering the layers within each slide.

Step 14: Final Delivery
1 hour

We went through the entire presentation again to make sure all the corrections had been made, and then we presented it to our jury.

circuitry is built in to the board itself. Although both boards capture stereo sound, the MediaTime offers a greater range of sampling rates (from standard Mac-quality mono sound to CD-quality stereo sound) and better overall sound controls.

Putting It All Together

Jumping into the world of multimedia isn't as easy as it might seem. Although slide presentations don't have much zip, they can be a lot easier to construct than presentations that use video, animation, and sound.

The products tested for this report are the first in what promises to be a large body of products that will let users include those more exciting elements with a minimum of hassle. For the most part, the products are still slightly immature, providing only small, jerky windows of video with mediocre sound quality — but they are enticing glimpses into the future.

Despite their limitations, these products function well for creating draft presentations for video and film projects as well as for decent — if limited — final output for business presentations or college lectures. Check the "Bottom Line" sidebar to find out which products we think deserve your attention.

Mark Frost is a *MacUser* associate editor.

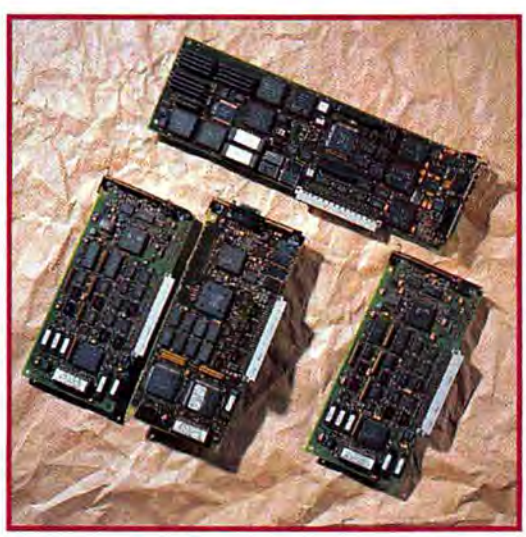
The Bottom Line

These are the pioneering days of digital video. If you're expecting full-screen, full-motion action, you'll be disappointed. But if you want to get started incorporating QuickTime movies into your presentations, you'll find that some useful tools are available.

When choosing a video-digitizing card, first decide whether or not you also need a display card. If you already have a 24-bit-display card or intend to use your Mac's internal video capability, your best value is the **SuperMac VideoSpigot** ($599 list, $499 street). Its good points — ease of use, high capture rates, and excellent editing software (Adobe Premiere) — outweigh the inconvenience of having to use Premiere to improve the poor sound quality of the Mac's internal microphone or of having to use the MacRecorder for those Macs that lack an internal microphone. All the digitizers that have no built-in sound capability have these problems, but only the VideoSpigot gives you an effective way of dealing with them.

If you don't already own a 24-bit video-display card, then direct your attention to the **RasterOps MediaTime** ($1,999 list, $1,570 street). This card offers 24-bit color on 13-inch monitors (640 x 480 pixels), decent-quality video captures (although limited to 15 fps), and fully integrated sound capture. If only the MediaTime could capture video at 30 fps.

The **SuperMac VideoSpigot Pro** ($1,499 list, $1,430 street) offers the same features and performance as the VideoSpigot but includes SuperMac's Spectrum/8•24 PDQ display card. This bundle is a good buy, but it takes up two NuBus slots (a one-slot version for the IIsi is also available).



The SuperMac VideoSpigot (bottom right) provides good image quality and the highest frame rate. The RasterOps MediaTime (top) does it all: video input and output with stereo sound. Although it hogs two NuBus slots, the SuperMac VideoSpigot Pro (left) provides high frame rates as well as accelerated 24-bit display for your 13-inch monitor.

Table 1 Criteria

List price — The list price is the manufacturer's suggested retail price.
Street price — The street price is an average actual price charged by dealers around the U.S. in June 1992.
Video signals supported — The video standards the card can digitize. NTSC is the standard in the U.S. and Japan; PAL is the standard in Australia and most of Europe; and SECAM is the standard in France, Eastern Europe, and the former Soviet Union.
Video input — The types of connectors on the digitizing card. S-video offers a cleaner signal than composite but is less common.
Mac monitors supported — The Mac video-display standards the card supports.
Audio input — The types of audio jacks the card has on-board.
Sound-sampling rates — The sampling rates the card supports, in kilohertz. (The higher the sampling rate, the better the sound quality.)
QuickTime-video capture — The name of the application included for capturing QuickTime clips.
Editing application — The name of the application included for editing QuickTime clips.
HyperCard XCMDs — Can the card be controlled through HyperCard?
Macromedia Director XOBJs — Can the card be controlled through Macromedia Director?
Image controls — Does the card/Vdig support image controls for hue, saturation, brightness, contrast, sharpness, and the like?
FCC certification — The type of certification (Class A or Class B) the card has. Class B is required for devices intended for residential use.

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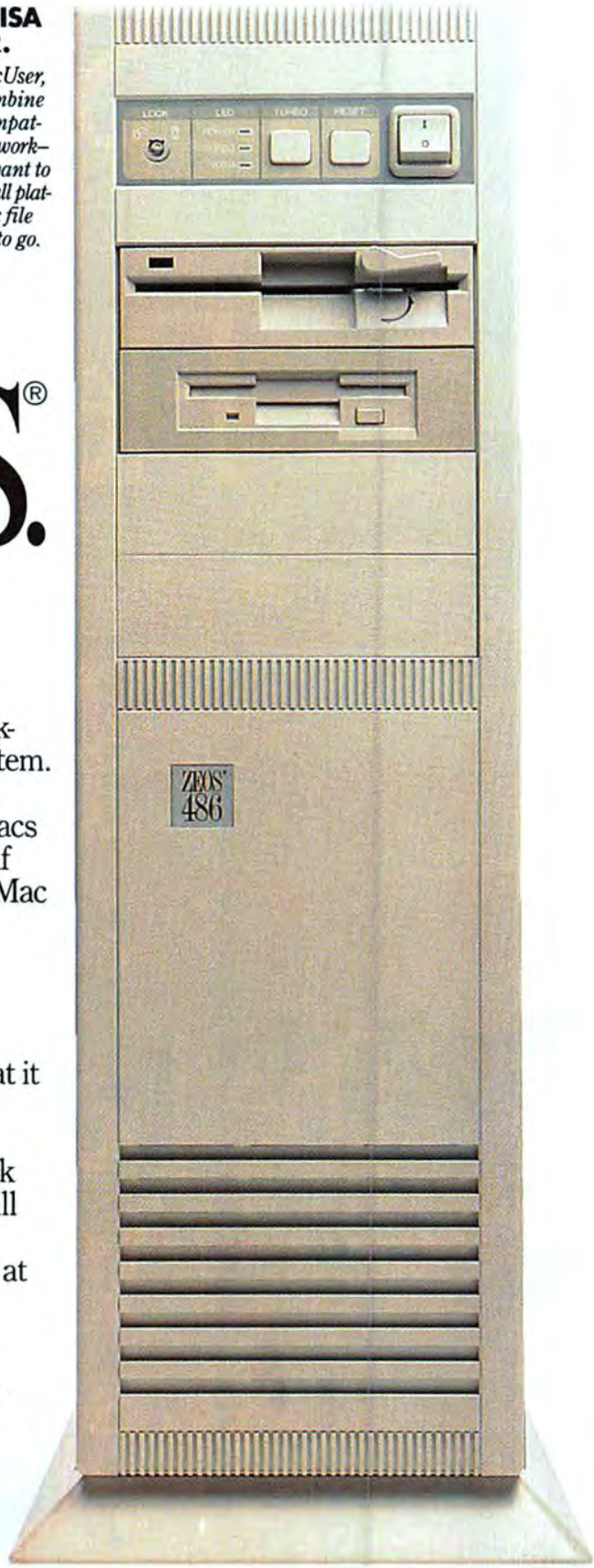

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Table 1: Features of Video-Digitizing Cards

● = yes ○ = no	Computer Friends MovieProducer ŧŧŧ	E-Machines QuickView Studio QT ŧŧ½	FAST Electronics Screen Machine ŧŧ	FAST Electronics Screen Machine Junior ŧŧ
List price	$1,195	$1,995	$1,999	$1,299
Street price	$799	$1,399	$1,900	$1,175
Pros	QuickTime-editing software included.	On-board sound input. QuickTime extension included.	QuickTime-editing software included. Good image controls.	QuickTime-editing software included. Good image controls.
Cons	No sound input.	Shipped with beta software. Incompatible with Tune-Up 1.1. Captures 8- or 16-bit color only.	No sound input. S-video nonfunctional. Produces screen artifacts. Defaults to PAL.	No sound input. Produces screen artifacts. Defaults to PAL.
Hardware				
Configuration	NuBus card	NuBus card and daughtercard	NuBus card	NuBus card
Video signals supported	NTSC (PAL option)	NTSC, PAL	NTSC, PAL (SECAM option)	NTSC, PAL (SECAM option)
Video input	composite, S-video	composite, RGB, S-video	composite, S-video	composite, S-video
Mac monitors supported	none	none	none	none
Bit depth at 640 x 480	NA	NA	NA	NA
Audio input	none	3.5-mm stereo audio jack	none	none
Sound-sampling rates	NA	22-kHz stereo	NA	NA
Software				
QuickTime-video capture	DiVA VideoShop	none	SM-Movie Maker 1.0	SM-Movie Maker 1.0
Still-video capture	ColorSnap 32+ 1.1.3	QuickView Studio QT 1.5	SM-Camera 2.5	SM-Camera 2.5
Editing application	DiVA VideoShop	none	SM-Movie Machine	SM-Movie Machine
HyperCard XCMDs	●	○	●	○
Macromedia Director XOBJs	○	○	●	○
QuickTime extension	○	●	○*	●†
Image controls				
Hue	●	●	●	●
Saturation	●	●	●	●
Brightness	●	○	●	●
Contrast	●	●	●	●
Sharpness	○	○	●	●
White level	○	○	●	●
Black level	○	○	●	●
Other				
FCC certification	Class A	Class A	none (Class B pending)	none (Class B pending)
Power consumption	8.5 watts	21.25 watts	14 watts	12.5 watts
Warranty	1 year	1 year	1 year	1 year
Company	Computer Friends 14250 N.W. Science Park Dr. Portland, OR 97229 800-547-3303 503-626-2291 503-643-5379 (fax)	E-Machines 9305 S.W. Gemini Dr. Beaverton, OR 97005 800-344-7274 503-646-6699 503-641-0946 (fax)	FAST Electronics 5 Commonwealth Rd. Natick, MA 01760 508-655-3278 508-650-0447 (fax)	FAST Electronics 5 Commonwealth Rd. Natick, MA 01760 508-655-3278 508-650-0447 (fax)

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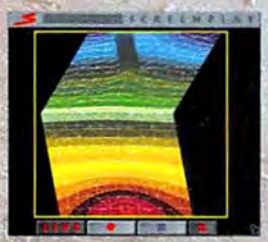

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CIRCLE 155 ON READER SERVICE CARD.

Table 1: Features of Video-Digitizing Cards, continued

● = yes ○ = no	Mass Microsystems QuickImage 24 $3½	RasterOps MediaTime $4	RasterOps 24MxTV $3	RasterOps 24STV $3½
List price	$495	$1,999	$2,199	$999
Street price	$464	$1,570	$1,794	$840
Pros	Inexpensive. FCC Class B certification.	Sound input. Video display. Good documentation. QuickTime extension included.	High frame-capture rates. QuickTime extension included. Video display with expansion connectors.	Video display with expansion connectors. Good documentation. QuickTime extension included.
Cons	No sound input. No image controls. Low frame-capture rate. Poor image quality.	Doesn't fit properly in IIcx, IIci, or Quadra 700.	No sound input. No installation instructions.	No sound input.
Hardware				
Configuration	NuBus card	NuBus card	NuBus card	NuBus card
Video signals supported	NTSC, PAL	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL, SECAM
Video input	composite, S-video	composite, S-video	composite, S-video	composite, S-video
Mac monitors supported	none	13-inch	13-inch, 16-inch	13-inch
Bit depth at 640 x 480	NA	1, 2, 4, 8, 16, 24	1, 2, 4, 8, 16, 24	1, 2, 4, 8, 16, 24
Audio input	none	2 stereo-in/2 stereo-out	none	none
Sound-sampling rates	NA	4, 11, 22, 44 kHz	NA	NA
Software				
QuickTime-video capture	none	MediaGrabber 2.0	MediaGrabber 2.0	MediaGrabber 2.0
Still-video capture	QuickImage 2.0	MediaGrabber 2.0	MediaGrabber 2.0	MediaGrabber 2.0
Editing application	none	none	none	none
HyperCard XCMDs	●	●	●	●
Micromedia Director XOBJs	○	●	●	●
QuickTime extension	○*	●	●	●
Image controls				
Hue	○	●	●	●
Saturation	○	●	●	●
Brightness	○	●	●	●
Contrast	○	●	●	●
Sharpness	○	○	○	○
White level	○	○	○	○
Black level	○	○	○	○
Other				
FCC certification	Class B	Class A	Class A	Class A
Power consumption	4 watts	14 watts	14 watts	8.5 watts
Warranty	1 year	3 years	3 years	3 years
Company	Mass Microsystems 810 W. Maude Ave. Sunnyvale, CA 94086 800-522-7979 408-522-1200 408-733-5499 (fax)	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-729-2656 408-562-4200 408-562-4065 (fax)	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-729-2656 408-562-4200 408-562-4065 (fax)	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-729-2656 408-562-4200 408-562-4065 (fax)

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Sony Trinitron Tube	YES
Four Resolutions 13" 16" 19" 21"	YES
Works with Built-In Video of Mac IIci, IIsi or Quadra	YES
MPR II	YES

CIRCLE 151 ON READER SERVICE CARD.

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Table 1: Features of Video-Digitizing Cards, continued

● = yes ○ = no	RasterOps 24XLTV $$$	RasterOps VideoTime $$$	SuperMac VideoSpigot $$$$	SuperMac VideoSpigot Pro $$$$
List price	$3,499	$1,499	$599§	$1,499◊
Street price	$2,926	$1,196	$499§	$1,430◊
Pros	Video display with expansion connectors. Good documentation. QuickTime extension included.	High frame-capture rates. Good documentation. QuickTime extension included.	QuickTime-editing software and extension included. High frame-capture rates.	Video display. QuickTime-editing software and extension included. High frame-capture rates.
Cons	No sound input. Expensive.	No sound input. Expensive for what it does.	No sound input. Poor image controls.	No sound input. Poor image controls.
Hardware				
Configuration	NuBus card	NuBus card	NuBus card	NuBus and video card
Video signals supported	NTSC, PAL, SECAM	NTSC, PAL, SECAM	NTSC, PAL	NTSC, PAL
Video input	composite, RGB, S-video	composite, S-video	composite	composite
Mac monitors supported	13 – 21-inch	none	none	13 – 21-inch
Bit depth at 640 x 480	1, 2, 4, 8, 16, 24	NA	NA	1, 2, 4, 8, 16, 24
Audio input	none	none	none	none
Sound-sampling rates	NA	NA	NA	NA
Software				
QuickTime-video capture	MediaGrabber 2.0	MediaGrabber 2.0	ScreenPlay	ScreenPlay
Still-video capture	MediaGrabber 2.0	MediaGrabber 2.0	ScreenPlay	ScreenPlay
Editing application	none	none	Adobe Premiere	Adobe Premiere
HyperCard XCMDs	●	●	○	○
Macromedia Director XOBJs	●	●	○	○
QuickTime extension	●	●	●	●
Image controls				
Hue	●	●	●	●
Saturation	●	●	●	●
Brightness	●	●	○	○
Contrast	●	●	○	○
Sharpness	○	○	●	●
White level	○	○	○	○
Black level	○	○	○	○
Other				
FCC certification	Class A	Class A	Class A	Class A
Power consumption	19.5 watts	12.5 watts	4 watts	4 watts
Warranty	3 years	3 years	5 years	5 years
Company	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-729-2656 408-562-4200 408-562-4065 (fax)	RasterOps 2500 Walsh Ave. Santa Clara, CA 95051 800-729-2656 408-562-4200 408-562-4065 (fax)	SuperMac Technology 485 Potrero Ave. Sunnyvale, CA 94086 800-334-3005 408-245-2202 408-735-7250 (fax)	SuperMac Technology 485 Potrero Ave. Sunnyvale, CA 94086 800-334-3005 408-245-2202 408-735-7250 (fax)

§An LC version is available for a list price of $499 (not including Premiere) and a street price of $420.

◊A IIsi version, which includes SuperMac's ZeroSlot adapter, is available for a list price of $1,499 and a street price of $1,395.

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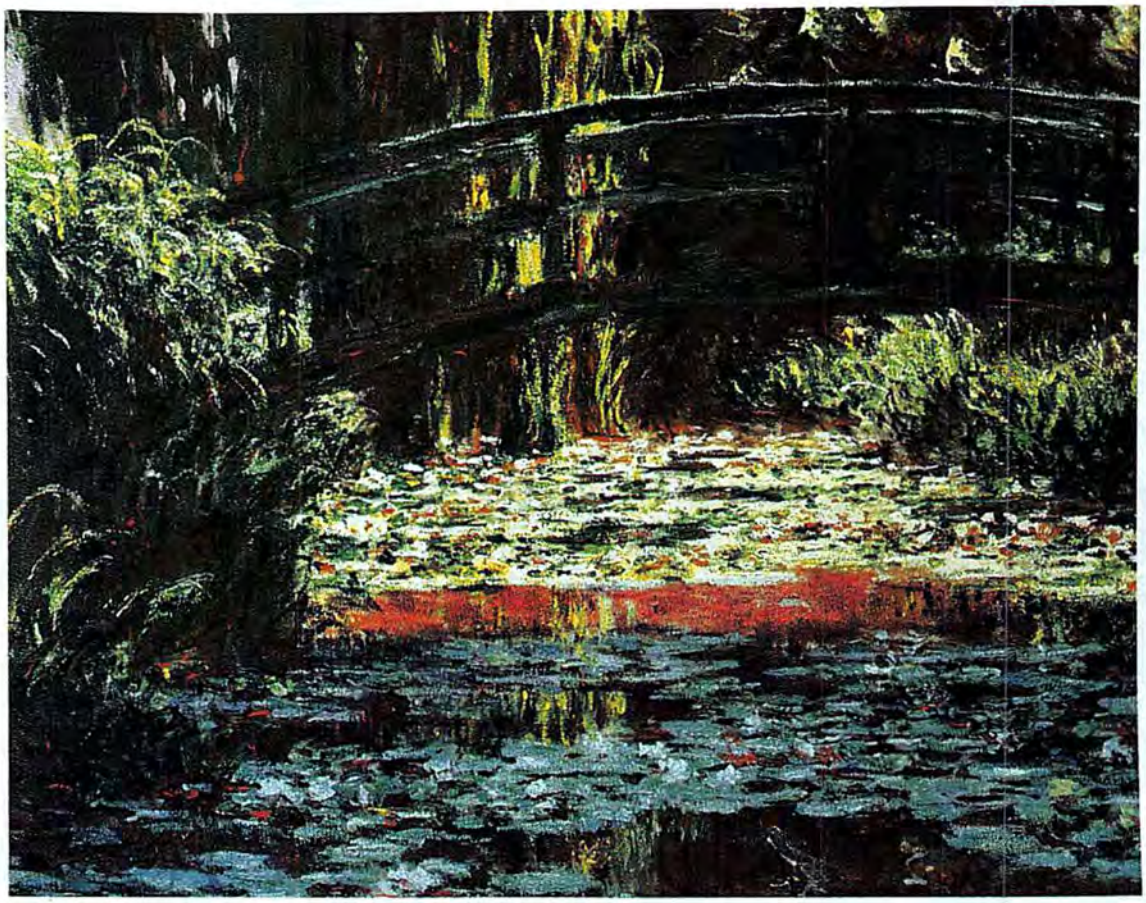
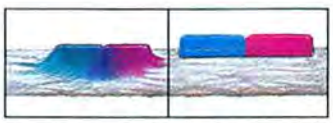


Claude Monet. *Japanese Bridge at Giverny, 1900.*

The image is priceless.

The clear superiority of solid ink technology is becoming legend.



Liquid ink bleeds, often causing unintended and inaccurate color. Solid ink does not.

Vibrant, precision color is finally here, and with JOLT™ it's also finally affordable.

Perhaps more surprising is that the image above is even better than this ad can show you, because this magazine uses a liquid ink which bleeds when it hits the paper. Solid ink holds its shape for noticeably better resolution.

Not only did Dataproducts pioneer the development of solid ink technology, our JOLT is also $3000 less than the only other color solid ink Adobe® PostScript,® Level 2 printer on the market. It's the world's lowest priced color solid ink printer.

Even more impressive is JOLT's flexibility. Because of the non-dispersing nature of solid ink, it can not only print on plain paper, but on virtually any paper surface, giving you immense lati-

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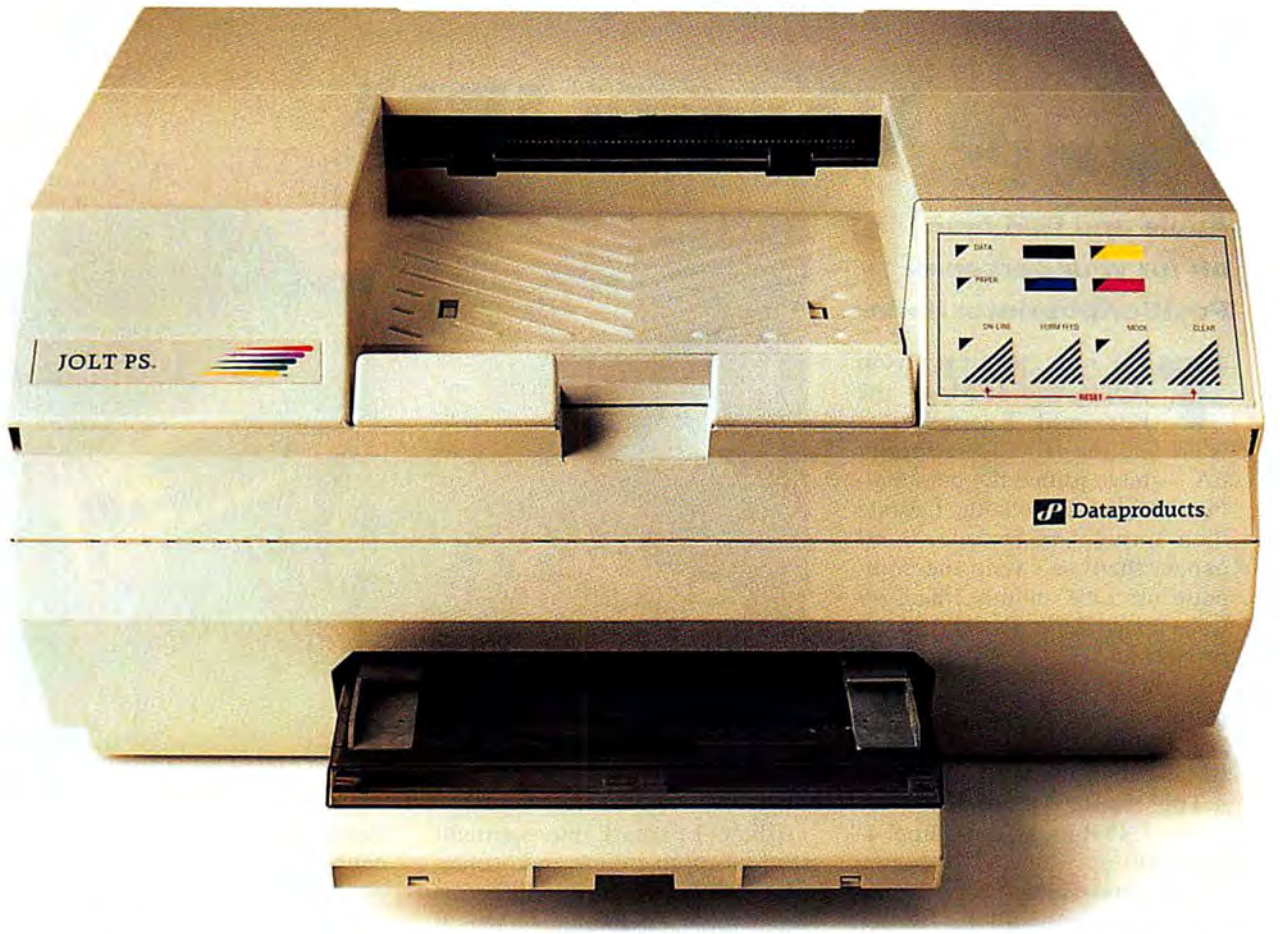
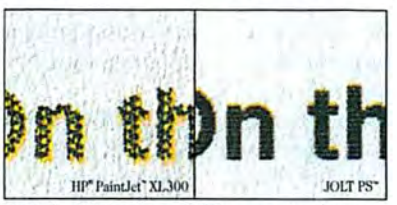
Claude Monet. *Japanese Bridge at Giverny, 1900.* Oil on canvas, 89.8 x 101cm, Mr. and Mrs. Lewis Larned Coburn Memo



Fortunately, the printer isn't.

tude when creating documents, presentations, publications and color comps.

And because of its solid ink technology, JOLT prints more readable text, even at extremely small point sizes.



Unlike liquid ink printers, JOLT creates crisp characters in solid, bold color (enlarged 250%).

Finally, JOLT is also more economical since it doesn't require any kind of special paper.

Imagine. Now you can produce 16.7 million different hues with the precision and vibrancy of solid ink technology, all at a remarkably low price.

So see your Dataproducts dealer today for a JOLT demonstration or call 1-800-334-3174 for more information.

Then stop by and check out JOLT, because when it comes to color printing, seeing is believing.

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The high performance printer people™

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CIRCLE 117 ON READER SERVICE CARD.

Apple Versus IBM

Apple and IBM face off for your personal-PostScript-printer dollar.

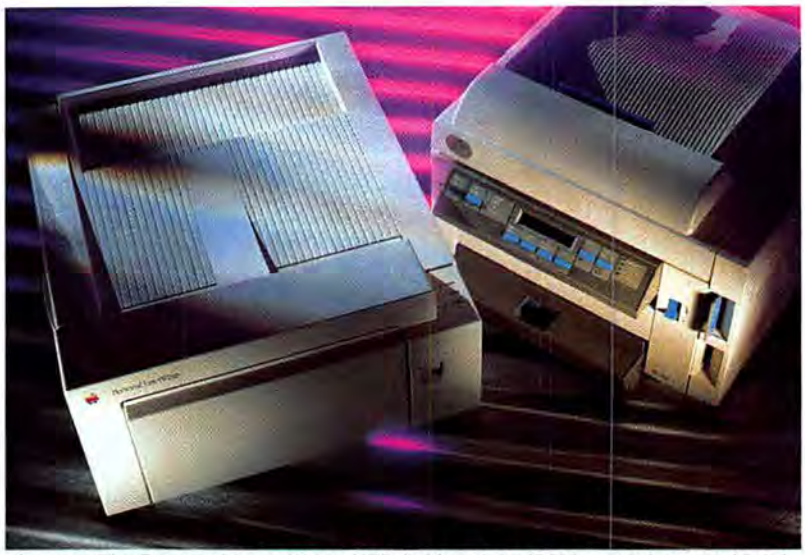

Figure 1: The Personal LaserWriter NTR (left) and the IBM LaserPrinter 6A (right) each show promise but could learn from the other's strengths.

Two new printers from Apple and IBM — the Personal LaserWriter NTR and the IBM LaserPrinter 6A — have joined the personal-PostScript-printer battle. Despite their impressive lineage, don't expect them to sweep the competition: Last month MacUser Labs tested 21 low-cost desktop printers and discovered that most were inexpensive, fast, and capable of excellent output (see "PostScript Printing That Won't Break the Bank," page 160).

The Apple Personal LaserWriter NTR uses the same 4-ppm 300-dpi Canon LX engine that was used in the recently discontinued Personal LaserWriter NT. However, the NTR uses a powerful RISC (reduced-instruction-set computing) processor, instead of the poky Motorola 68000 used in the NT, and an Adobe PostScript Level 2 interpreter that offers better performance than the Level 1 interpreter of the NT.

The IBM LaserPrinter 6A, which is produced by an IBM affiliate, Lexmark International, uses a 6-ppm engine and proprietary PQET (Print Quality Enhancement Technology), which improves the quality of its 300-dpi output. At $2,695, the LaserPrinter 6A is priced higher than many other printers in its class, and it uses aging technology: a PostScript Level 1 interpreter and a 10-megahertz Motorola 68000 — even the outdated LaserWriter NT runs its 68000 at 12 megahertz.

We reviewed 21 additional personal PostScript printers — each costing less than $3,000 — in September 1992.

The Bad News

We put the Personal LaserWriter NTR and the IBM LaserPrinter 6A through the same tests we used when preparing our September article: printing a 15-page Microsoft Word document, a 5-page Microsoft Excel spreadsheet, and a 5-page Aldus Persuasion document.

The Personal LaserWriter NTR showed a significant overall speed improvement over the NT (see Figure 2). Its RISC processor tore through the complex Persuasion file almost 50 percent faster. However, its slow 4-ppm engine makes it a poor choice if you need to print long text documents — only 6 of the 21 printers in our September report were slower in the Word-document test.

Although the LaserPrinter 6A's 6-ppm engine produced acceptable results in our text test, the printer's slow processor caused it to finish behind even the venerable NT in our presentation test — slower than all but 4 of the 21 printers in the September article. Don't buy a LaserPrinter 6A if you plan to use your personal PostScript printer for desktop publishing or graphics.

The Good News

The LaserPrinter 6A compensates for its slow speed with superior image quality. IBM's PQET smooths the 300-dpi jaggies and produces higher-quality output than the NTR's unenhanced 300-dpi output. Furthermore, the LaserPrinter 6A

PHOTOGRAPHY: STAN MUSILEK

offers excellent paper handling for a personal printer — a standard 250-sheet tray and optional 500-sheet and 75-envelope feeders with software that controls which tray is active.

Another of the LaserPrinter 6A's strong points is that it is upgradable. It costs $1,000 to upgrade the processor, which increases the engine speed from 6 ppm to 10 ppm. You can also increase the resolution from 300 dpi to 600 dpi by upgrading the RAM from 2 megabytes to 6 megabytes for $799. Apple has handicapped the Personal LaserWriter NTR by making the 250-sheet tray optional ($200) — it came standard with the NT. Without this tray, you're limited to a 50-sheet input tray.

One clear — and surprising — advantage of the NTR is that it's easier for Macs and PCs to share: It includes simultaneously active and auto-sensing LocalTalk, serial, and parallel ports, whereas the LaserPrinter 6A has only a LocalTalk port.

The Bottom Line

Finally, you can enjoy personal PostScript printing on demand without incurring the wrath of your accounting department. However, your best personal-PostScript-printer purchase is one of the recommended printers in our September '92 report — and not the Personal LaserWriter NTR or the IBM LaserPrinter 6A.

Both of these printers show flashes of brilliance, but both are hampered by major flaws. Compared with the 21 printers in the September report, they fail to break out of the middle of the pack — although a couple of tweaks could make either one a tough competitor. As they're now equipped, each is just a notch above average.

— Paul Yi

Figure 2: Not So Fast

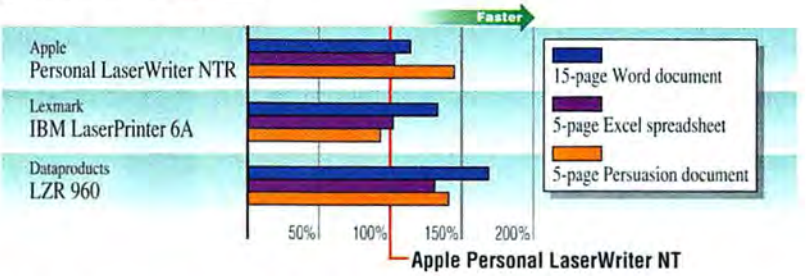

Figure 2: The Personal LaserWriter NTR's RISC processor blazed through our Aldus Persuasion test, but the printer's sluggish 4-ppm engine struggled with our Word document. The IBM LaserPrinter 6A's 6-ppm engine was faster when printing text, but its slow processor fell behind when printing the Persuasion presentation. Both printers were disappointments compared with the 9-ppm RISC-based PostScript Level 2 Dataproducts LZR 960.

Figure 3: IBM's Advantage

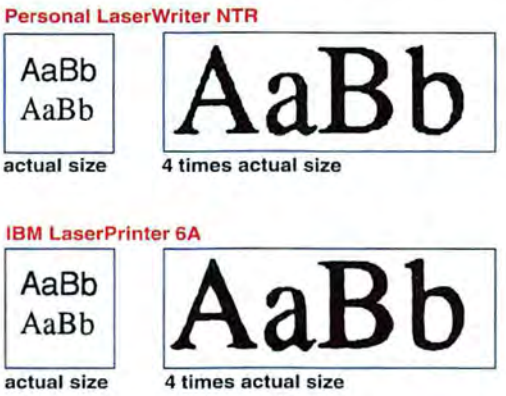

Figure 3: The IBM LaserPrinter 6A's PQET produces crisper and smoother characters than those printed by the Personal LaserWriter NTR, which has no print-enhancement features.

Table 1: Pros and Cons

	Apple Personal LaserWriter NTR ★★★½	Lexmark IBM LaserPrinter 6A ★★★½
List price	$2,195	$2,695
Street price	$1,715	$2,215
Pros	Fast graphics performance. Multiplatform compatibility.	Very good text quality. Flexible paper handling.
Cons	Slow engine. Inadequate 50-sheet paper tray.	Slow processor. Expensive.
Company	Apple Computer, Inc. 20525 Mariani Ave. Cupertino, CA 95014 800-776-2333 408-996-1010 408-974-6726 (fax)	Lexmark International, Inc. 740 New Circle Rd. Lexington, KY 40511 800-358-5835 606-232-2000

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The LC, the si and the Classic II are all great "little" machines. These Macs work great at home and have boosted efficiency in the office, but, until now, you could only get 100 megabytes inside.

APS introduces the 7213—the new, very fast, very quiet 200 MB hard drive from Maxtor. Best of all, you can put it inside your LC, si or Classic II!

$569 in APS ZFP Case

The New Maxtor 7213

- Maxtor's 7213 not only provides you with over 200 MBs of storage, but it fits internally in the Mac LC, LCII, si, and Classic II. And, of course, it fits in most of the other Macs too.
- The 7213 is very fast—an average seek time of 15 ms and a data transfer rate of 1.8 MB/sec.
- The 7213 is very quiet—only 35 dBA in idle (spinning) on-track mode with an operating vibration of only 1G.
- The 7213 also provides low power consumption—only 3.7 watts needed to read or write—that's less than other "low power" drives.
- All in all the Maxtor 7213 is the perfect fit for the Mac that needs a little more hard disk space inside.

Great Prices. Priceless Support!

Why Choose APS Technologies?

- Toll-free technical support—call as often or for as long as you need. See why APS has won 2 MACWORLD Service hero awards!
- 30-Day, No-Questions-Asked, Money-Back Guarantee.
- Disk-for-Disk Replacement Warranty—you'll probably never need it, but if you do, 90% of our warranty service is performed within 48 hours (most within 24 hours). Return shipping via FEDEX Standard Overnight Service—no charge.
- Helpful, informative 160-page manual.
- 24-hour BBS with the latest version of our software.

• **30-Day Money-Back Guarantee** • Your risk in the transaction is the cost of shipping. • **Disk-for-Disk Replacement Warranty** • Maxtor, Quantum, SyQuest and DAT drives carry a two-year "parts & labor" disk-for-disk replacement warranty. WREN, TEAC, Toshiba drives and SyQuest cartridges carry a one-year "parts & labor" disk-for-disk replacement warranty. Fujitsu drives carry Fujitsu's five-year warranty.

• **Brackets and Cables Included** • All hard drives include brackets, cables, cords and LEDs required for operation in the specified Macintosh. All hard drives come pre-formatted with Apple's latest stable all-platform System software, 9.2mb of compacted publicly distributable software, and APS Technologies' "ALLIANCE POWER TOOLS" SCSI formatter/hard partitioner. • **Prices & Specifications Subject to Change Without Notice** •

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APS Technologies, 2900 S. 291 Hwy., Independence, MO 64057

1-800 235-2750

CIRCLE 146 ON READER SERVICE CARD.

UMAX UC1200S

A fast high-resolution scanner that won't bust your budget.

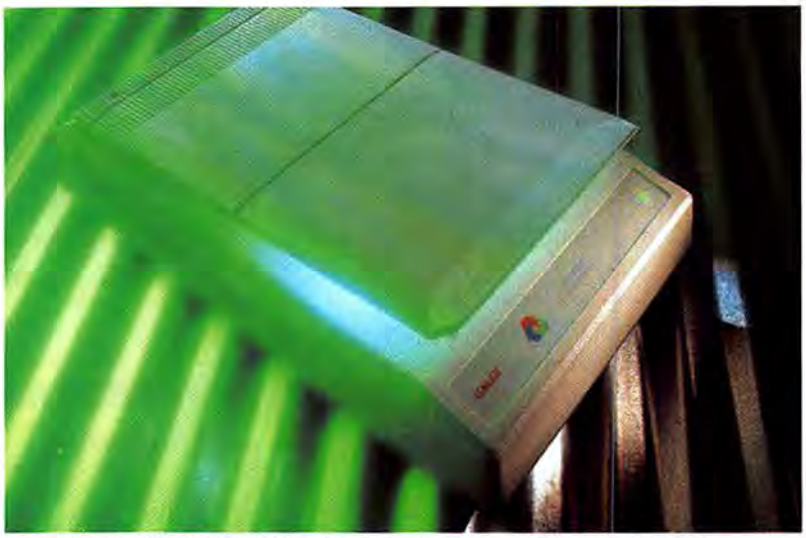


Figure 1: The UMAX UC1200S color flatbed scanner delivers vibrant high-resolution images and sharp line art.

You've been working all week on a brochure for your most important client. You've finally found the perfect cover photo, but it's too small. So you scan it on your 300-dpi color flatbed scanner and enlarge the scanned image — but when you increase it to the size you want, the image becomes fuzzy. You've just discovered a major shortcoming of low-resolution scanning: A 300-dpi image simply doesn't have enough detail for decent enlargements. A high-resolution scanner would help, but most suffer from a different shortcoming: a price of around $10,000.

That is, until now. The UMAX UC1200S breaks the price/performance barrier for fast high-resolution color scanners, at less than $5,000 (through most dealers). Its 600-dpi scanning engine can see four times as much detail as that of a 300-dpi scanner (360,000 versus 90,000 dots per square inch). The UC1200S also uses software interpolation — which creates an additional dot between each of the scanned dots and assigns this new dot's color in relation to adjacent pixels — to provide high-resolution scans of 1,200 dpi, or nearly 1.5 million dots per square inch.

When we last looked at color scanners ("Capturing Color: 24-Bit Scanners," December '91, page 152), the UMAX UC630 was a top performer.

The high resolution of the UC1200S makes it possible to enlarge a scanned color image without losing detail. The reason is simple: When you scan a color image for four-color printing, you get the best results by scanning at a dpi setting that's one and a half or two times as high as the *screen frequency* — the lpi (lines-per-inch) rating — at which you plan to print. For example, to print an image at actual size at 150 lpi, scan at 225 or 300 dpi. If you plan to print at twice the size of your original image, scan at 450 or 600 dpi. If you want to enlarge your image to four times its actual size, you'll need to scan at 900 or 1,200 dpi — and if you want to spend less than $5,000 to do so, you'll need a UMAX UC1200S.

Quick Quality

Even the highest-resolution output will be worthless if the color is not accurate. Not to worry: The UC1200S reads color very accurately and has no registration problems (poor registration causes a thin black line to appear as three different bands of red, green, and blue). When we gave the UC1200S a tough color-accuracy test — scanning 37 gray swatches, ranging from white to black — the red, green, and blue elements of gray were perfectly balanced.

Although color accuracy is important, no one wants to spend a lot of time waiting for it. The UC1200S doesn't disappoint: Our testing proved it to be more than 20 percent faster than its high-speed sibling, the UMAX UC630, when scanning a 4-x-5-inch image at 300 dpi. The UC1200S is one of the fastest flatbed scanners available, because it has a one-pass — versus a three-pass — scanning engine and a 2-megabyte image buffer.

PHOTOGRAPHY: STAN MUSILEK

The UC1200S' software is easy to use and gets the job done fast, but it does not follow all the normal Mac interface guidelines. Look out for unexpected dialog boxes and cryptic messages — "Link is Failure" was one of our favorites.

The Bottom Line

Controlled tests are revealing, but the best test of a scanner is in how it scans a continuous-tone photographic image — the kind that you were trying to scan into that brochure for your most important client. When we scanned such an image, the UC1200S displayed excellent color fidelity while capturing more shadow detail and providing a sharper image than the UC630 did. If you need a high-resolution scanner but have been unable to afford one, the UMAX UC1200S may be the scanner for you. At its $5,495 list price, the UC1200S is much cheaper than other scanners that offer comparable resolution. At a street price of well under $5,000, it's an excellent buy.

— Bruce Fraser

Table 1: Pros and Cons

	UMAX UC1200S ttttˉ
List price	$5,495
Street price	$4,450
Pros	Fast. Low price for a high-resolution scanner. Good color quality. Good registration.
Cons	Software interface can be confusing.
Company	UMAX Technologies, Inc. 3170 Coronado Dr. Santa Clara, CA 95054 800-562-0311 408-982-0771 408-982-0776 (fax)

Figure 2: Crisp and Clear Line Art

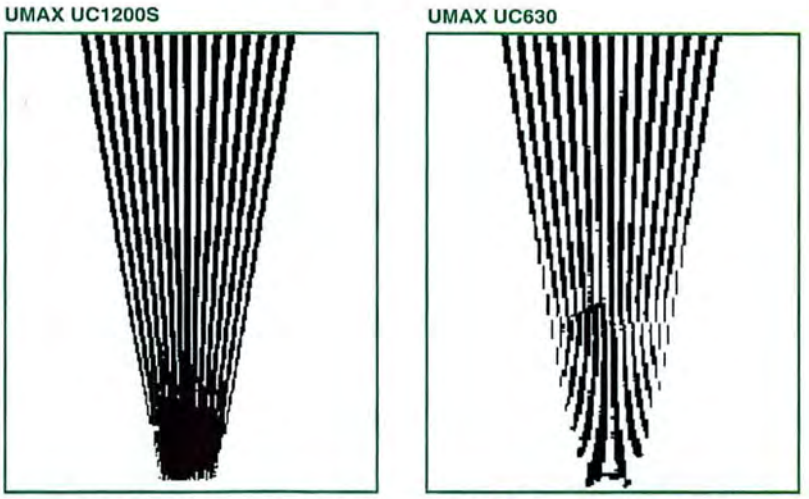
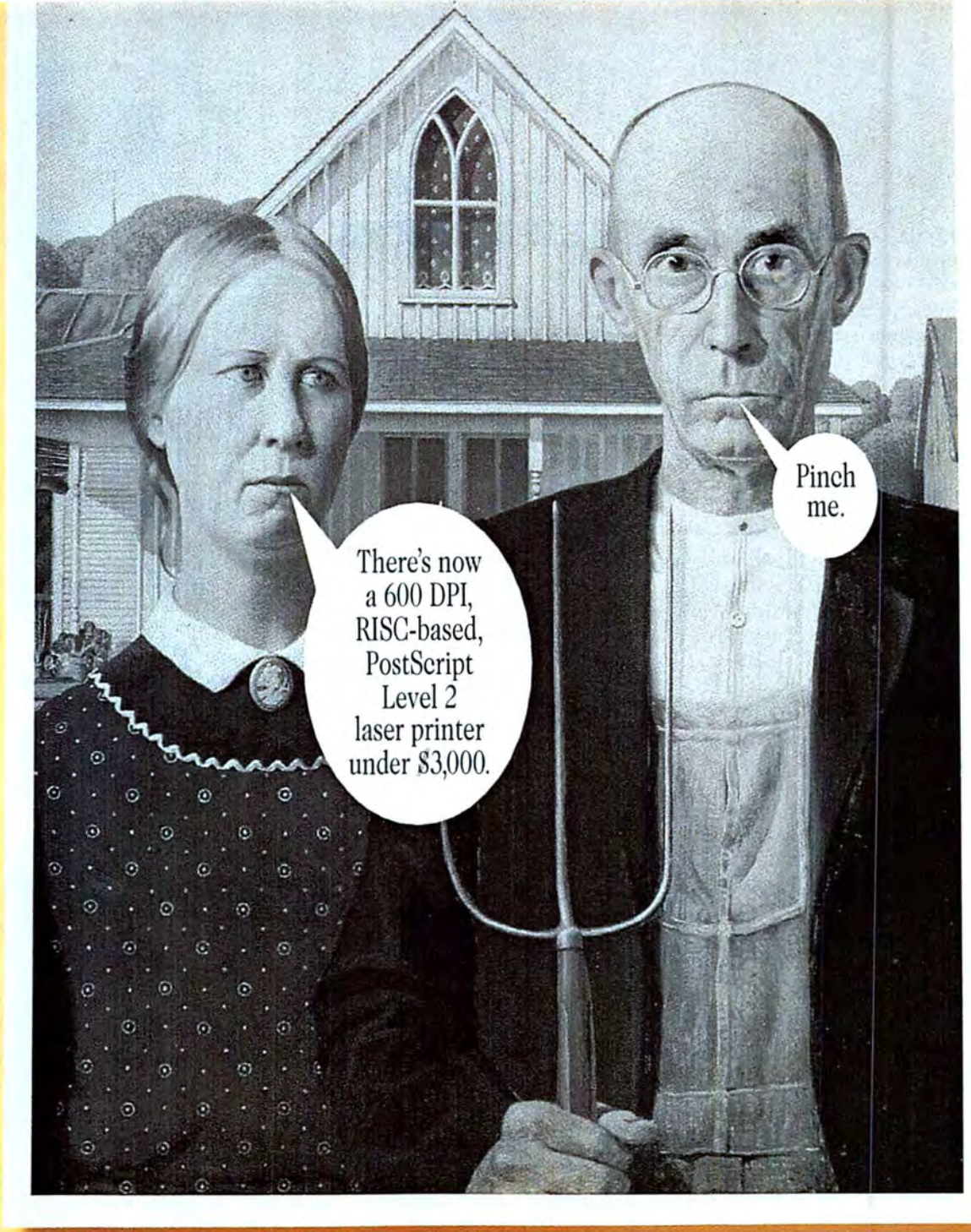


Figure 2: The 1,200-dpi UMAX UC1200S is capable of capturing great detail and sharp line art without jagged edges. Images from the UC630 — a top 300-dpi scanner — suffer from jagged edges.

Figure 3: Detailed Enlargements

Figure 3: The UMAX UC1200S and UC630 have comparable image quality when a 4-x-5-inch photograph is printed at actual size. If you take that same image and enlarge it to tabloid size, however, you'll notice a difference — the scan from the 300-dpi UC630 becomes fuzzy and pixelated. The 1,200-dpi UC1200S produces more image information, so you can enlarge a scanned image without an obvious loss of image quality.



The new LZR 965 from Dataproducts gives you everything you want from a laser printer at a price that may startle you. This true 600 x 600 dpi, Adobe® PostScript® Level 2 laser printer gives you greatly enhanced gray scale capabilities for optimum detail in graphics and photographic images. Even 4-point type is made clean and easy to read. And since the RISC-based processor can provide fast, flawless delivery of higher resolution images your output can look like a masterpiece every time. In no time.

	List Price	PPM	RISC Processor	Postscript Level 2	Resolution 600x600	Warranty
LZR 965	$2,995	9	Yes	Yes	Yes	2 years
IBM 4029-10A	$3,995	10	No	No	Yes	1 year
Apple LaserWriter IIg	$4,999	8	No	Yes	No	1 year
QMS PS815MR	$5,495	8	No	No	Yes	1 year

Combine Mac and PC system compatibility and superior paper handling with a very small footprint and you'll begin to experience the whole picture.

You don't need a trained eye to see that the extraordinary image quality and technologically advanced features will make this printer a classic for years to come. Add the fact that it's easy to use and inexpensive to own and you'll know why the LZR 965 has everybody talking. For finer details, contact the Dataproducts dealer nearest you or call 800-334-3174.

Dataproducts.

The high performance printer people.™

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CIRCLE 116 ON READER SERVICE CARD.

CalComp ColorMaster Plus

Sturdy, versatile, and easy to use, these two printers simplify your move to quality color.

Figure 1: Two sturdy siblings: the CalComp ColorMaster Plus 6603PS (left), which produces letter-sized output, and the 6613PS (right), which prints on tabloid-sized media. Each provides quality color output at an attractive price.

The more powerful a printer, the harder it is to use, right? Not if it's a ColorMaster Plus from CalComp. Although some color printers may give you fits with their arcane manuals, complicated commands, and clumsy consumables, the ColorMaster Plus duo of PostScript-compatible thermal-wax-transfer printers (identical except for media size) is simple and effective.

From the moment we turned on the power to the instant the last test page settled into its vertical media tray, neither ColorMaster Plus — the 6603PS for letter-sized output or the 6613PS for tabloid-sized — gave us any trouble. An exceptionally well-written manual, complete with a troubleshooting section and glossary, guided our test technicians through setting up the printers and installing software and fonts.

Although we connected our test Macs to the printers' LocalTalk ports, their RS-232 serial and Centronics parallel ports can be simultaneously connected to PCs and the printers can switch among them automatically. Each printer also has a SCSI port for attaching a hard drive for font caching — much faster than downloading nonresident fonts for each print job.

We compared the printing speed and output quality of the ColorMaster Plus 6603PS with that of our current favorite, the Tektronix Phaser II PXi (see "Thermal-Wax-Transfer Color Printers," May '92, Buyer's Guide page 42). The champ still reigns supreme, noticeably faster but only marginally better in image quality. However, the ColorMaster Plus 6603PS lists for $2,500 less — a very good price for such a well-built, convenient printer.

— Rik Myslewski

Check out CalComp's competition in the May '92 Buyer's Guide, page 42.

Figure 2: Printing Speed

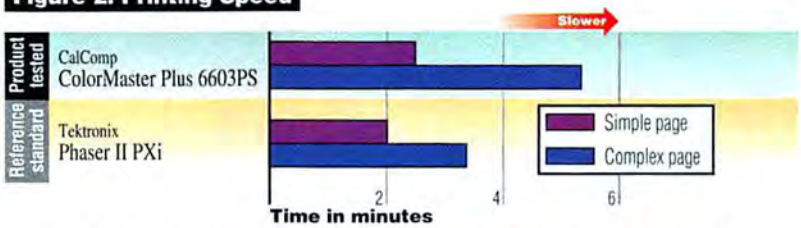

Figure 2: The ColorMaster Plus 6603PS' powerful 16-megahertz i960 RISC processor and speedy PhoenixPage PostScript Level 1 clone interpreter couldn't keep up with the 24-megahertz Am29000 RISC processor and Adobe's PostScript Level 2 interpreter in the Tektronix Phaser II PXi when printing either a simple letter-sized presentation or a complex page filled with PostScript images.

Table 1: Pros and Cons

	CalComp ColorMaster Plus ¢¢¢¢
Price (list/street)	
6603PS (letter)	$5,495/$5,495
6613PS (tabloid)	$9,995/$7,900*
Pros	Easy to use. Excellent manual. SCSI port.
Cons	Mediocre speed. Large footprint.
Company	CalComp 2411 W. La Palma Ave. Anaheim, CA 92801 800-932-1212 714-821-2000

*Also sold as the RealTech Color 350 ($5,995 direct) by Hardware That Fits, 610 S. Frazier, Conroe, TX 77301; 800-364-8737.

PHOTOGRAPHY: STAN MUSILEK

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CIRCLE 102 ON READER SERVICE CARD.

Owning most utility software packages is like belonging to the Auto Club.

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Instead of getting you back up and running, Public Utilities concentrates on *keeping* you up and running.

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Every half hour (more often if you're cautious, less often if you're a daredevil) Public Utilities performs a detailed diagnostic scan of your disk.

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All you have to do is point, click and carry on with whatever you were doing.

(You may also gasp, sigh, and pat yourself on the back for ordering Public Utilities as soon as you heard about it.)

It doesn't take an MIS type to appreciate what Public Utilities can mean in higher productivity and lower support costs.

But if you *are* an MIS type, you'll be delighted to know that, in addition to protecting your people from disaster, Public Utilities reminds them to do prudent things like perform regular backups, update their passwords and optimize their hard disks.

It even launches the requisite software for them, at a stroke.

(If the requisite software doesn't happen to be a Fifth Generation product, Public Utilities will launch it anyway.)

Of course, even Public Utilities can't prevent people from deleting their files or reformatting their hard disks.

But it can bail them out of more difficult situations than any other utility software.

And unlike other programs, it won't *let* them get into difficult situations.

That's because we left out Sector Editors and other such high end, high risk things. And put in plenty of on-line HELP.

Naturally, we made it System 7 savvy, so you can utilize such helpful features as virtual memory and Apple Events.

There's more. So pick up the phone.

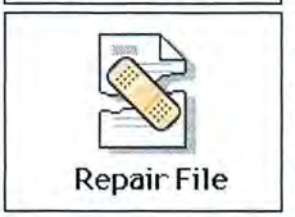
Call 1-800-666-2904. We'll tell you about our vaunted 24-hour toll-free customer support.

Which is what you use to get out of trouble *after* you get into it.

To get you back up and running promptly, Public Utilities offers the most complete after-the-fact diagnosis and repair.

Public Utilities automatically finds, detects and repairs a range of common disk problems before they crash your system.

Accidentally delete a file or reformat your hard disk? Not to worry. Public Utilities can help you recover.



When Finder can't find it, or your word processor can't read it, your best shot at salvaging that valuable file is Public Utilities.

To make sure you get the highest performance, Public Utilities packs an automatic disk optimizer.

FIFTH GENERATION SYSTEMS, INC

THE RASTEROPS CORRECTPRINT 300. ITS OUTPUT IS YOUR INCOME.

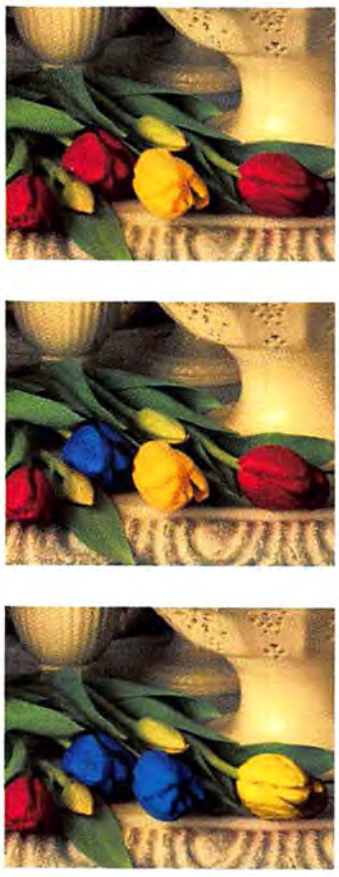
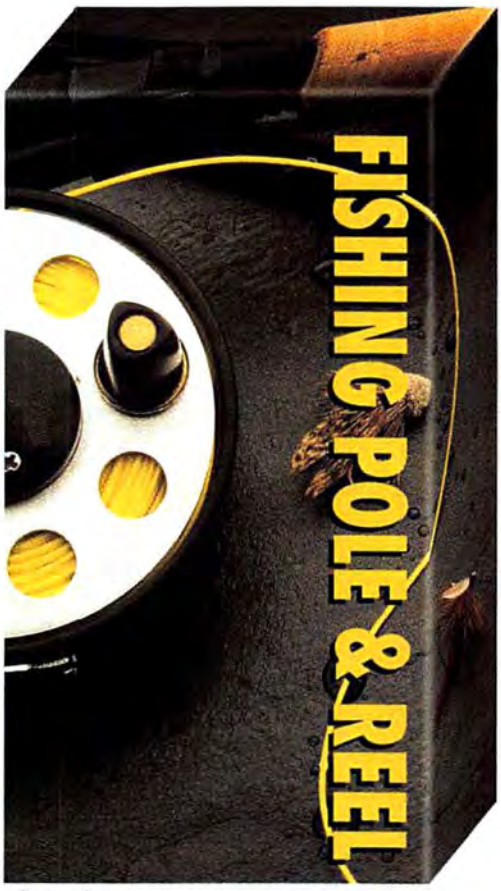


IMAGE RETOUCHING



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The RasterOps CorrectPrint 300 is the truly affordable photorealistic color printer that's as good as gold. It saves you time and money because you no longer have to send out for color prints. And its beautiful, high-resolution output helps you sell your ideas more successfully. Whether you use the RasterOps CorrectPrint 300 for presentation overheads, layouts, comps or image retouching, its output will ensure your ideas don't go flat on paper.

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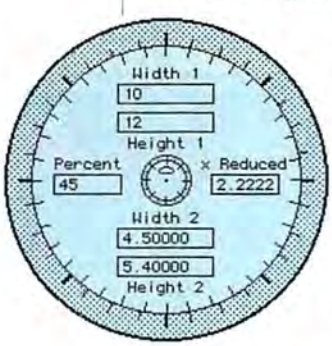
Want to add the eye-catching look of foil stamping to presentations, invitations, and certificates? Desktop Color Foil, from PaperDirect, uses the heat from a laser printer or copier to overlay its metallic colors on previously printed text or graphics. The added color (choose from 16) sticks only to laser or copier toner and is permanent. $19.95 per roll or package of 16 sheets. 800-272-7377 or 201-507-1996.

By Aileen Abernathy

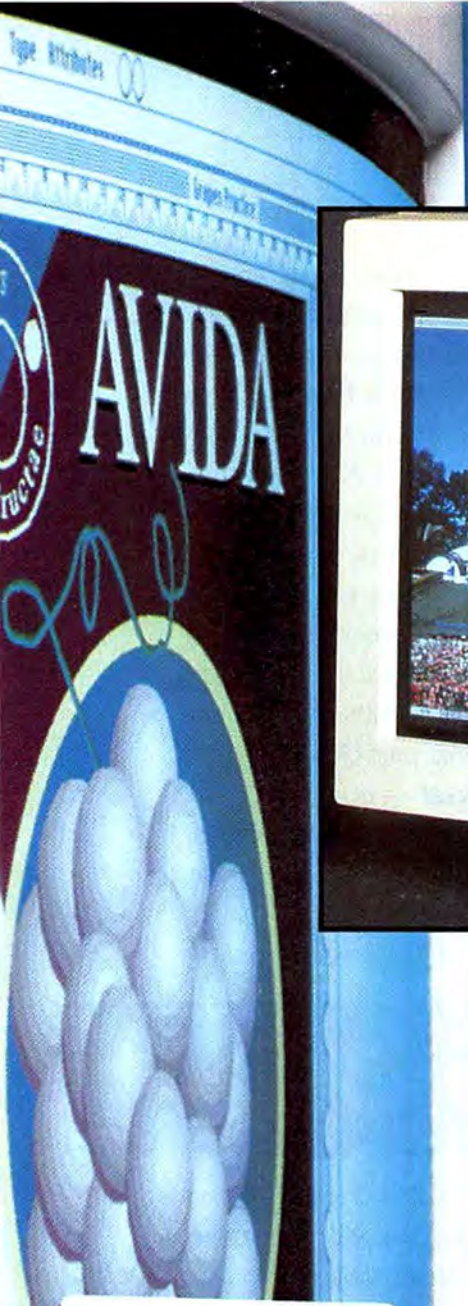
Getting graphics: Aldus has acquired Fetch (née Multi-Ad Search), the multiuser image-cataloging and -retrieval program from developer Provident Software. This slick piece of software stores pointers for as many as 32,000 graphics and QuickTime movies per database; the original files can reside on any number of disks and servers. You can view cataloged images as thumbnails or at full size, play QuickTime movies, search for images based on several criteria (including keywords), and save files of selected images. System 7 users can use drag-and-drop to automatically catalog entire volumes. Fetch works with every Mac graphics format plus QuickTime and sound files. The program is currently being **Aldus-ized** — new name, price, interface, and documentation — and should be available by year's end. Meanwhile, Aldus is licensing Fetch to developers who need a front end for browsing through, previewing, and retrieving CD-based image collections.

Clip artistry: 3G Graphics has released Volume 2 of Accents & Borders, its award-winning collection of EPS frames, ornaments, tiles, symbols, and borders (right). The $150 package contains more than 300 images, some of which are in color, in a variety of styles. 206-774-3518. ✳ For EPS clip art with **a patriotic theme,** Federal Clip Art, from One Mile Up, offers excellent renditions of government, military, and diplomatic subjects. Many of the images use Pantone colors. 703-642-1177. $225 to $345 per package. ✳ Transverter, from TechPool Software, converts EPS clip art into PICT files for use in presentations or in programs such as SuperPaint, MacDraw, or Microsoft Word. The $90 utility can turn color EPS files into gray-scale images, line art, or silhouettes, and it can convert entire libraries automatically. 800-925-6998 or 216-382-1234.



Productivity boosters: Sometimes it's not the big applications but the little ones that really simplify life. DesignSoft offers two such gems for $29.95 apiece. ProWheel, an electronic version of the familiar proportion wheel, lets you convert among common units of measurement and figure enlargement/reduction percentages for photos and graphics. StopWatch is **a timer with a twist.** It keeps track of your billable hours for a project, prints time sheets, and times two simultaneous tasks — *and* it works even if the computer is turned off. 800-426-0265 or 708-653-2700.

HARDWARE THAT FITS



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Mac II, IIx, IIcx, IIci, IIfx, Quadra 700 & Quadra 950	24-bit system (accelerated)	2749
Quadra 700 & Quadra 950	On-board video	1895

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Mac II family, SE/30, IIsi, LCII	GS 256	879
Mac IIsi, IIci, Quadras	GS 16	449

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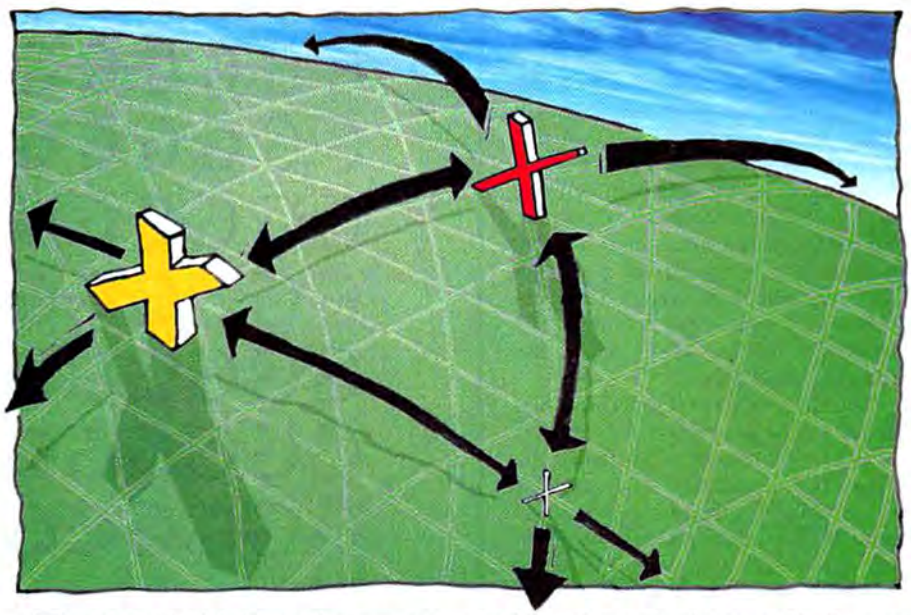
CIRCLE 198 ON READER SERVICE CARD.

Flexible Fonts

Adobe's Multiple Master fonts bring new power to digital typography, with on-the-fly font creation, better copy fitting, and the promise of true document portability.

By Bruce Fraser



Adobe's Multiple Master fonts are perhaps the most radical development in type since Gutenberg's day. The Multiple Master technology, an extension of the PostScript Type 1 format, exploits the digital nature of PostScript type to a hitherto undreamed of extent, offering typographic flexibility far beyond anything seen before.

Type changed relatively little during the first 500 years of printing. Separate fonts for each size, weight, style, and typeface were cut by hand, in metal. With the advent of hot-metal type, separate fonts were still required for each size (and the other attributes), but the process of setting type became much faster. Then came phototypesetting, in which a single font could be used for a narrow range of sizes. But type didn't become completely scalable — doing away with the need for separate fonts for each size — until the advent of digital typography in the 1970s. When PostScript appeared in 1985, fonts became amenable to other kinds of transformation: stretching, condensing, expanding, and so forth. Unfortunately, such transformations distort the shapes of the characters, altering their proportions and changing the relationship between thick and thin strokes.

Adobe's revolutionary Multiple Master technology was announced in 1991 (see "The Future of Type?", July '91, page 187). Multiple Master fonts eliminate the aesthetic problems of contorting type. Using a single Multiple Master font file, you can generate — on the fly — thousands of typographically correct weights, widths, and even styles for a typeface. Yet the font takes up only three or four times as much space on-disk or in printer memory as a regular Type 1 font does. Adobe released the first Multiple Master typefaces, Myriad ($370) and Minion ($470), earlier this year.

What's the Big Idea?

The principle behind Multiple Master fonts is *interpolation,* the ability to create intermediate shapes between two preexisting ones. (This same concept is used to blend shapes in PostScript illustration programs such as Adobe Illustrator and Aldus FreeHand.) A conventional Type 1 font contains a single set of character outlines; for example, Helvetica and Helvetica Condensed are separate fonts. A Multiple Master font, on the other hand, contains several sets of master character outlines (hence the name) arranged in a matrix (see Figure 1). By interpolating between the master outlines, or master designs, a Multiple Master font can produce literally tens of thousands of different fonts. Myriad for example, contains the potential for more than 28,000 unique fonts.

A simple Multiple Master font might contain two master designs, one for a very condensed font and the other for a very extended font. Any intermediate-width font would be produced by interpolation between the two master designs. Such a Multiple Master font

is termed a *single-axis* font. The different fonts produced by interpolation along the axis are called *instances*, and the range of instances that can be generated along a particular axis is called the *dynamic range*.

In practice, most Multiple Master fonts have intermediate master designs along the axis, rather than just one at each end. This approach has two benefits. First, it makes the designer's task a bit simpler, because it provides more control over the interpolation — the narrower the range over which the interpolation takes place, the more predictable the result. Second, depending on the intermediate master designs, one part of the dynamic range can reflect very large changes to the font's appearance, whereas another can reflect relatively small ones.

The Multiple Master format is not limited to a single axis, however. It can have as many as four axes — width, weight, optical scaling, and style — although the fonts Adobe has shipped so far have at most three axes. Myriad is a sans serif two-axis font, with a width axis (from condensed to extended) and a weight axis (light to black). The three-axis serif font, Minion, is a Multiple Master rendition of the Adobe Original Minion font; it has an optical-scaling axis in addition to the width and weight axes.

Width and weight are fairly obvious, but for those who have dealt only with digital type, optical scaling requires explanation. In the days of metal type, a typeface's characters changed subtly at different point sizes. At small sizes, the thin strokes were made slightly fatter, to prevent them from disappearing, and the x-height (the height of lowercase characters such as *a, e,* and *x*) was often increased to aid legibility, particularly at sizes of less than 9 points. With scalable digital type, however, all the point sizes are scaled from a single outline, so these subtle distinctions are lost. Until the Multiple Master format arrived, the closest approximations to optical scaling available in digital type were font pairings such as Minion Regular, which has character shapes designed for text use, and Minion Display, which was created for use as display type.

Because it has an optical-scaling axis, the Multiple Master version of Minion restores these subtleties to a PostScript font. As the type size increases from 6 to 72 points, the space between and within Minion's characters (the letterfit and counterforms) is reduced, the weight of the characters becomes lighter, the serifs become more delicate, and the x-height becomes smaller (see Figure 2).

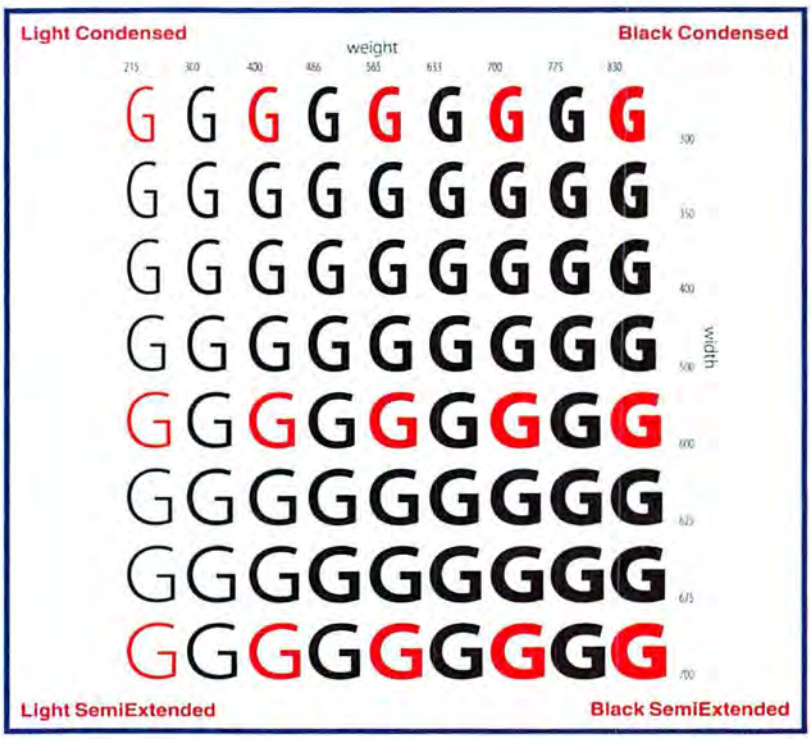


Figure 1: A Multiple Master font file can generate thousands of typographically correct fonts by interpolating between master designs. Adobe's Multiple Master version of Myriad lets you create fonts along two axes, width and weight, offering the potential for more than 28,000 unique instances (72 are shown here).

Important note: If you're working within an application, you don't automatically get the optically scaled Multiple Master font you want when you choose a particular point size. The format's optical scaling merely lets you create an instance of the font that is optically correct for a particular point size. To use optical scaling correctly, you must specify the type size and then choose the corresponding instance for that size. Future versions of applications may be able to automatically choose the correct optically scaled font for a given point size, but for now you must do it manually.

Adobe has taken a conservative approach with its initial offerings, using weight and width as the standard axes and adding optical scaling as a third variable. But with the fourth axis, style, the possibility exists for much more radical treatments of Multiple Master type. For example, a style axis could range from a serif design at one end to a sans serif design at the other or from a high-contrast design, with fine hairlines and heavy stems, to a low-contrast one, with little difference between thick and thin strokes. In fact, a Multiple Master typeface could use *only* style axes.

Truly radical Multiple Master fonts may be on the horizon, now that Altsys has released Fontographer 3.5. This version of the venerable font-creation program lets you produce Multiple Master fonts that contain any or all of the possible axes, either from scratch or from existing Type 1 fonts.

Working in Hyperspace

Designing any font is a far from trivial undertaking, but this is doubly true for a Multiple Master font. You design the extremes — the character forms that lie at the ends of the design axis — but the instances that lie near the center must look good, so you are continually adjusting the ends to fit the middle. Creating intermediate master designs along the axis can help, but some type designers have likened designing Multiple Master fonts to working in hyperspace.

Other constraints also exist. Matching

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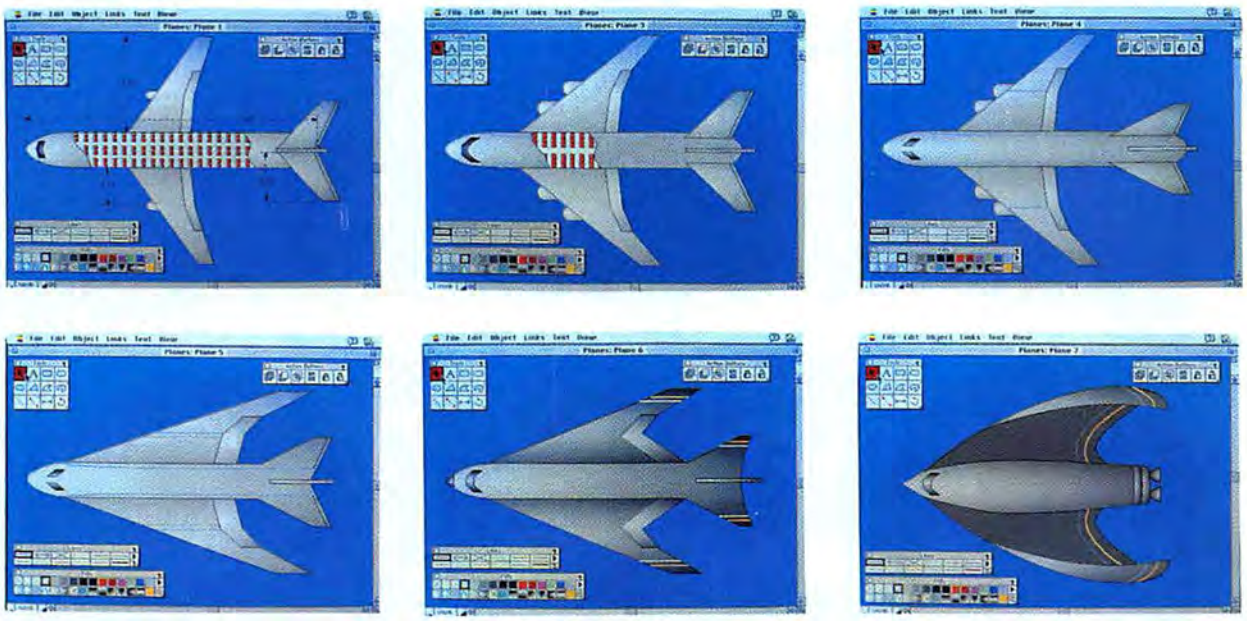

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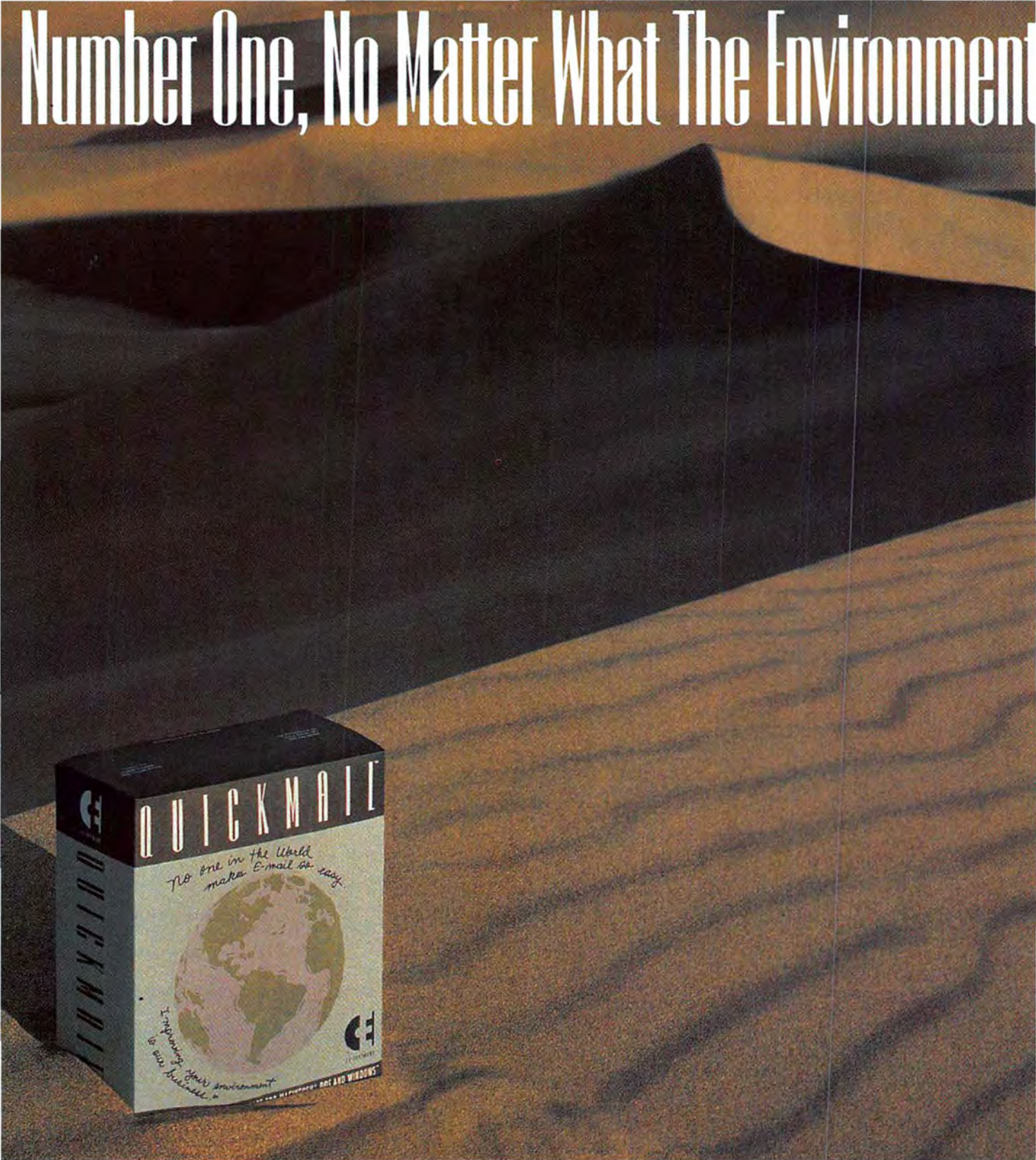

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characters in all master designs must have the same number of control points, and the corresponding control points must be of the same type — corner, curve, or tangent points. So you can't simply take existing fonts, place them in the corners of the matrix, and merrily start interpolating your own instances.

Actually, Fontographer 3.5 will let you do just that, but it resolves discrepancies by inserting extra control points where needed in the master designs. This approach is useful for minor differences, but if you try to interpolate from, say, Times to Helvetica, you'll end up with fonts that are cumbersome and ugly. Because they contain many unnecessary control points, such cobbled-together fonts are bigger, requiring more disk and RAM space than a custom-designed Multiple Master font. They also require more calculation on the part of the PostScript rasterizer, so they take longer to print. Some instances will be so ugly that they'll be unusable. Finally, some characters probably have to be redrawn to get them to work at all. Successful Multiple Master fonts really must be designed from scratch.

The inherent design difficulties make it unlikely that we'll see a huge number of Multiple Master fonts appearing soon. Adobe has no plans to convert its existing library to Multiple Master fonts — many existing typefaces simply aren't suited to this format. But the company will almost certainly convert some of its Adobe Original designs to Multiple Master format. The Minion Expert Set should be shipping as you read this, and Adobe is working on other font conversions and on some entirely new faces.

Other type vendors are also evaluating the Multiple Master format. The first third-party typeface, a Multiple Master version of Bodoni created under the direction of renowned typographer Sumner Stone, will be a joint effort by Adobe, Xerox, and ITC (International Typeface Corp.).

Big Benefits

Multiple Master fonts provide enormous typographic variety, but they offer powerful benefits in other areas as well. A good example is copy fitting, for headlines as well as body copy. If a headline is too long or too short, existing Type 1 fonts can be horizontally scaled to fit. This solution has a serious disadvantage, however: The proportions between the horizontal and vertical elements of the letterforms become distorted, sometimes unpleasantly so. A Multiple Master font with a width axis allows you to expand or condense the font as needed to make the headline fit while retaining the font's design integrity.

Likewise, when a column of text is a couple of lines too long, existing applications let you adjust the letterspacing to make the copy fit. This method has two disadvantages. First, legibility often suffers as the characters are squeezed together. Second, and equally offensive to type purists, the *typographic color* of the letterspaced text changes. Typographic color is the overall density, texture, and tonal value a typeface displays on a page. If you tighten up the letterspacing to make excess text fit into one column, the text you've adjusted will look darker than the rest of the text, giving it an undesired emphasis. By creating an appropriate instance of a Multiple Master font, however, you are able to fit the copy into the required space without changing the overall color or reducing its legibility (see Figure 3).

Unfortunately, today's applications don't support Multiple Master fonts directly. Word-processing and page-layout programs don't have commands for automatically tightening up text. Instead you must use Adobe's Font Creator application to create new instances of the fonts and then apply them as you would any other font. This manual approach can be tedious, in that it usually takes some trial and error to generate the correct instance for an ideal fit.

Multiple Master typefaces also offer performance advantages over a family of related Type 1 faces. For example, suppose you create a document that contains three weights each of a condensed and a regular typeface. You could specify all these fonts as instances of MM Myriad, a 75K font file that can be downloaded to a PostScript printer. Once the font is downloaded, all that gets sent to the printer for the different instances are the weight and width values. If you were to use Adobe's Univers family instead, you'd need to download separate outlines for Condensed Light, Condensed Book, Condensed Bold, Light, Book, and Bold — six outlines at around 30K apiece. The Multiple Master font takes up less space in printer memory and requires less electronic traffic between the Mac and the printer.

Document portability is another area in which Multiple Master fonts may play an important future role. The holy grail of document portability is the ability to take a document from one computer and view it on another with the original formatting

Figure 2: The Multiple Master version of Minion has an optical-scaling axis. At small sizes (top), the x-height is increased, the serifs and thin strokes are thickened slightly, and the overall spacing is increased. At larger display sizes (bottom), the serifs and thin strokes are more delicate and the spacing between and within characters is tighter. (Labels don't reflect actual size.)

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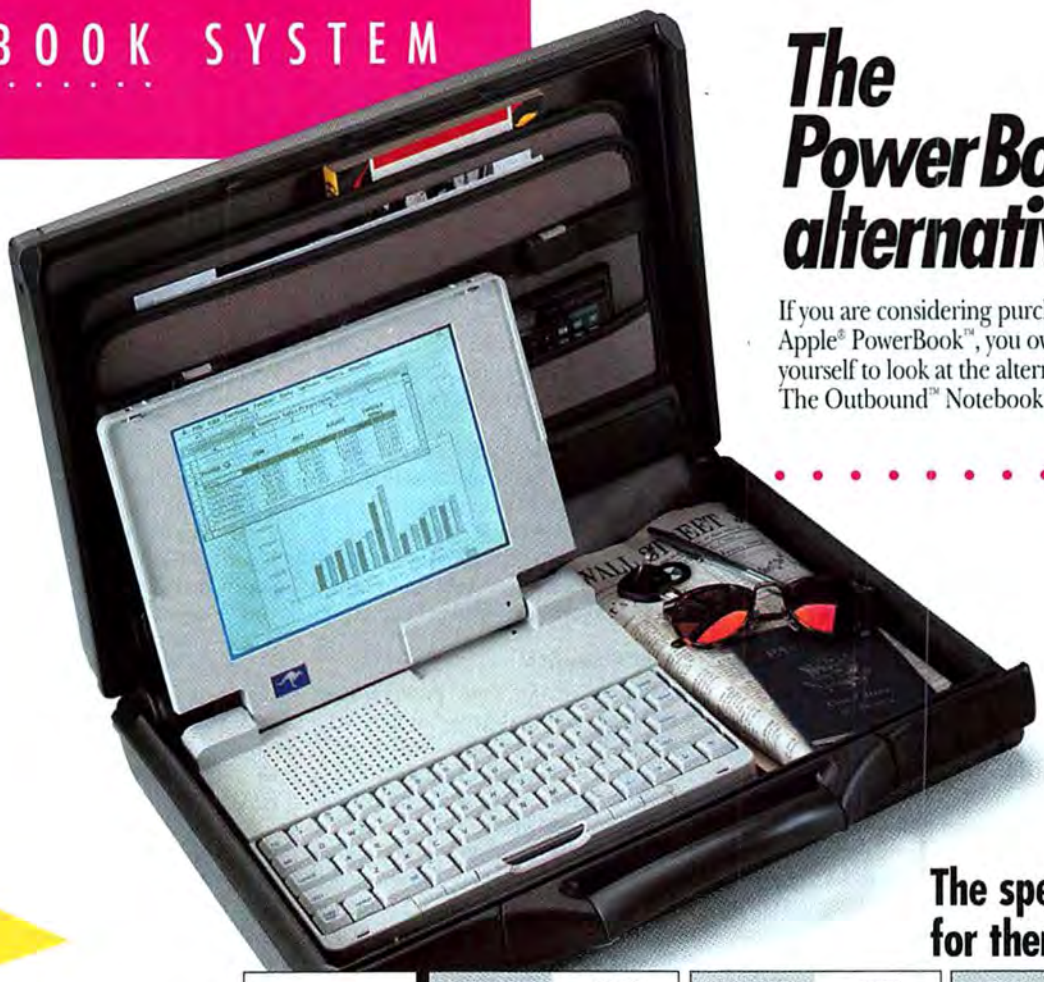

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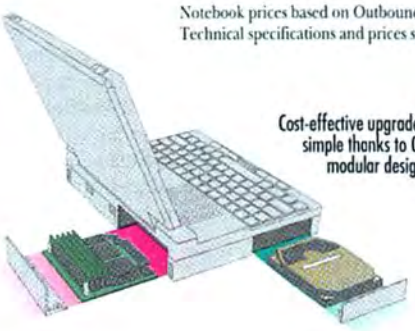

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Figure 3: If a headline is too long, one approach is to adjust the letterspacing, but this makes the type look dark and cramped (top). If you horizontally scale the type, say by 84.5 percent (middle), the relationship between the horizontal and vertical strokes becomes distorted. But by creating an appropriate instance of a Multiple Master font (bottom), you can fit copy without sacrificing good letterspacing or type proportions.

intact, without regard to platform, application, or installed fonts. Adobe is also at the forefront of this technology; its implementation is code-named Carousel, and it should come as no surprise that Multiple Master fonts are an integral part of the plan (see "The Universal View Master," March '92, page 183). If a document's original fonts aren't present on the current system, Carousel will perform font substitutions on the fly, using Multiple Master fonts. Justification, line breaks, leading, and other attributes will be preserved, making unwanted reformatting a thing of the past.

Delivering on the Promise

So much for the theory behind Multiple Master fonts. How do they work in practice?

Like conventional Type 1 fonts, Multiple Master typefaces ship with outline-font (printer-font) files and a suitcase file that contains bit-mapped (screen) fonts. You can install Multiple Master fonts in the System file as you would a regular Type 1 font or use them with a font-management utility such as Suitcase, from Fifth Generation, or MasterJuggler, from ALSoft.

Multiple Master fonts need special software, however. Most important, they require version 3.0 of ATM (Adobe Type Manager) — it's included in the font packages — for both screen display and output, even to PostScript printers. At present, the *only* way to get ATM 3.0 is to buy a Multiple Master font, but Adobe will make available a Multiple Master-capable general release of ATM at an as-yet-unspecified future date. The reason Adobe hasn't released ATM 3.0 to the general public yet is because it's almost twice the size of its predecessor and the only new feature is Multiple Master support. If you are a registered owner of Fontographer 3.5, you can get ATM 3.0 by purchasing a Multiple Master font from Adobe for $149.

Each Multiple Master font comes with several predefined, or primary, instances. For example, Myriad provides 30 predefined fonts (15 each for the regular and italic versions), and Minion has 14 (7 regular and 7 italic). If you plan to use only these instances, you don't really need any software other than ATM 3.0. Because of the Multiple Master format's naming conventions, however, it's nice to have Adobe Type Reunion (ATR) 1.03 (included in the package), which makes font menus appear much tidier (see Figure 4).

The primary instances of Myriad appear on the Font menu with names such as Myria MM 215 LT 300 CN, Myria MM 400 RG 600 NO, and Myria MM 700 BD 700 SE. The letters refer to a particular axis (CN is the condensed portion of the width axis) and the numbers to a position within the dynamic range of that axis (300 and 700 represent opposite ends of the width axis). Translated, these cryptic names are Myriad 215 Light 300 Condensed, Myriad 400 Regular 600 Normal, and Myriad 700 Bold 700 SemiExtended.

User-defined instances follow the same naming pattern, except that lowercase letters are used. For example, Myria MM 240 wt 315 wd corresponds to Myriad 240 weight 315 width. If you don't use ATR, each instance becomes a separate entry on your Font menu.

To create your own instances of a Multiple Master font, you must install the Multiple Master INIT and Font Creator application (again, these are included with the fonts). The Font Creator application is very simple. For each axis, a slider control lets you set a value (see Figure 5). Alternatively, you can type in a value. A sample area shows how the font will look with the currently chosen values.

When you click on the Create button, Font Creator adds a new screen font to the Multiple Master suitcase file. The screen font contains a FOND resource with the axis values and the kerning and character-metrics information for that instance. The printer font is unchanged. Each new instance takes up 15K to 20K of disk space (the suitcase containing the primary instances takes up 550K for Myriad). So Font Creator also lets you remove instances to save disk space. If you delete a primary instance and later want it back, you can regenerate it by clicking on Font Creator's Primary button.

Font Creator has one major drawback: It's completely modal, forcing you to quit before you can return to another application. This makes working with Multiple Master fonts far more tedious than it

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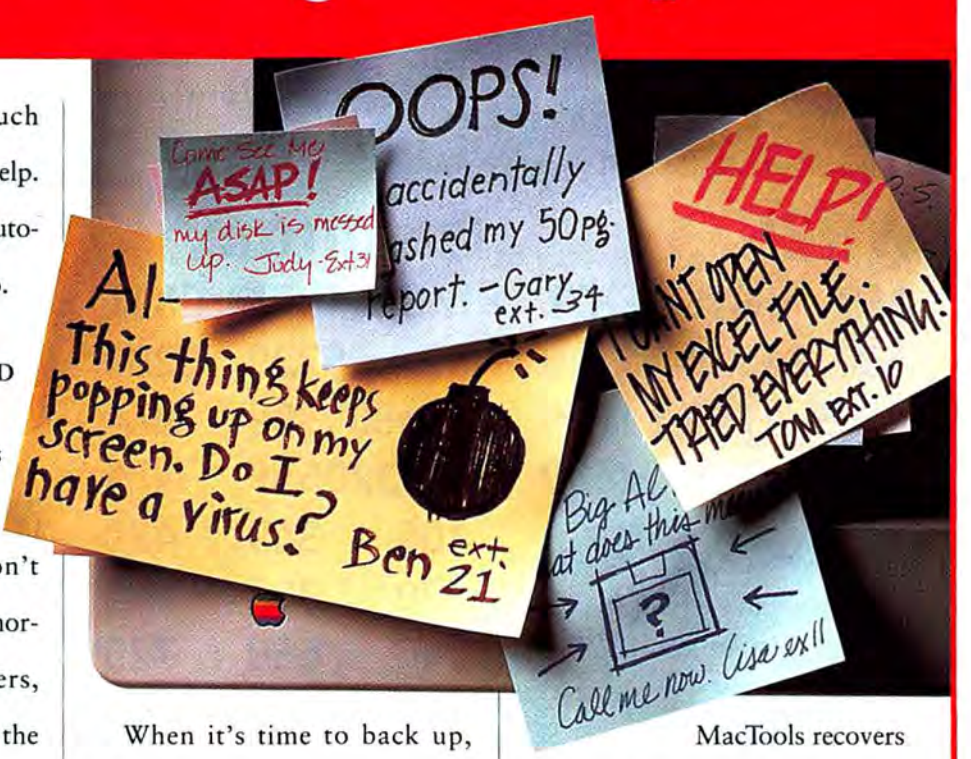

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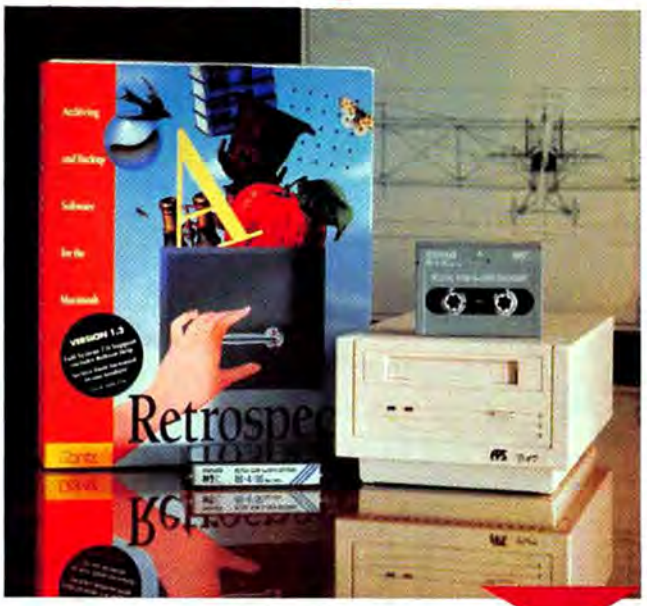

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should be, particularly when it takes several attempts to find the exact instance you need.

Applications that are sufficiently savvy to update the Font menu dynamically — such as QuarkXPress, PageMaker, and Adobe Illustrator — display newly created instances immediately. With other programs, such as Microsoft Word, you have to quit and restart before you can access the new instance.

Clearly, this is a less than elegant means of working. Adobe needs to convince developers to provide Multiple Master support that allows users to create instances from within applications. Multiple Master fonts will then become much more useful, and working with them will be much easier. Adobe has already distributed code to third-party developers, for headline copy fitting, and it hopes to distribute body-copy-fitting code soon. Future versions of applications such as PageMaker, QuarkXPress, Illustrator, and FreeHand will offer control over Multiple Master fonts directly, obviating the need for Font Creator.

The only programs that currently offer special Multiple Master support are Illustrator 3.2, QuarkXPress 3.1, and Premiere 2.0. When you open an Illustrator 3.2 document that contains instances of a Multiple Master font that aren't installed, Illustrator automatically generates the missing instances if the Multiple Master font is available. Quark's free Multiple Master XTension for QuarkXPress 3.1 provides the same capability, both for native QuarkXPress files and for imported EPS graphics; it also lets you launch Font Creator from a menu within QuarkXPress. Version 2.0 of Adobe's slick video-editing software, Premiere, produces animated titles with Multiple Master fonts. The program generates needed instances on the fly to create smoothly animated text sequences.

If the demand is sufficient, other developers will probably provide similar types of internal support for Multiple Master fonts, but to some extent it's a chicken-and-egg situation. Font developers want applications that support Multiple Master fonts before they invest time and effort in developing those fonts, and application developers want more fonts available before they build Multiple Master support in to their programs. Adobe is working on both parts of the problem by developing new fonts and making code available to developers.

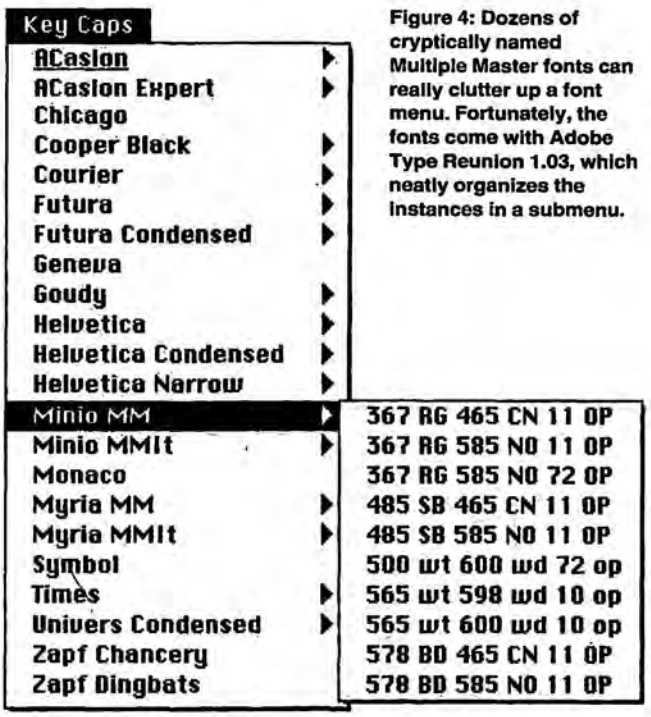

Figure 4: Dozens of cryptically named Multiple Master fonts can really clutter up a font menu. Fortunately, the fonts come with Adobe Type Reunion 1.03, which neatly organizes the instances in a submenu.

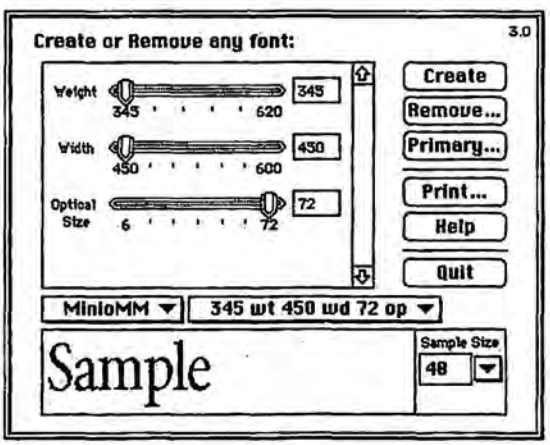

Figure 5: The Font Creator application lets you quickly create instances of a Multiple Master font. Slider controls let you set values for each axis; you can also type in values. A sample area shows how the font will look with the currently chosen values. The utility's major drawback is its modality: You must quit Font Creator before you can return to another application.

And finally, what about printing? Multiple Master fonts should, in theory, behave just like any other Type 1 font when you issue the Print command. We've had more than a few reports of problems, however, mainly with Multiple Master fonts failing to download automatically. You can circumvent most, if not all, such printing problems by manually downloading the fonts with a printing utility such as Apple's LaserWriter Font Utility, Adobe's Downloader, or CE Software's LaserStatus. Presumably, the long-awaited Apple/Adobe PostScript Level 2 print driver will make manual downloading unnecessary, but in the interim, it saves a lot of trouble.

For now, Multiple Master fonts are a very promising technology that translates into a somewhat kludgey product. If you're prepared to put up with a slightly awkward way of working, the Multiple Master format provides an unprecedented degree of typographic flexibility and versatility, at a price that works out to about 1.5 cents per font!

Contributing editor Bruce Fraser is well acquainted with the pitfalls of serving multiple masters and adapts himself accordingly.

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Reaching for 3-D

Today's 3-D programs are easier than ever to use, bringing 3-D artwork within the grasp of any illustrator.

By Janet Ashford

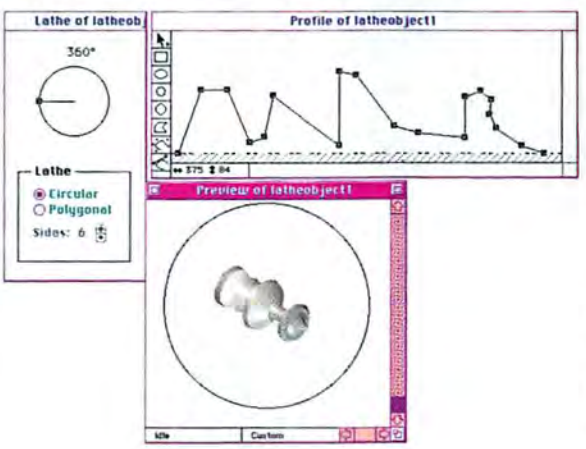
Creating realistic 3-D graphics is easier than you think, even if you don't know a *z*-plane from a glue stick. A new crop of Mac 3-D programs is aimed at mainstream computer illustrators instead of architects, engineers, and animators. Programs such as Ray Dream Designer and Alias Sketch! emphasize affordability and ease of use, enticing 2-D artists into the multidimensional realm.

Seattle illustrator Jeff Brice used Ray Dream Designer to create elements for the cover of an art-store catalog. The illustration features a woman wearing virtual-reality goggles, reaching for a 3-D sculpture. Brice created the sculpture in Ray Dream Designer and then used ColorStudio to silhouette and composite the 3-D image into his final illustration.

Ray Dream Designer is actually two programs in one: LightForge, which lets you create objects, and SceneBuilder, in which you manipulate, light, and render them. The rendering process uses ray tracing, which simulates the way light rays bounce among objects, light sources, and a "viewpoint."

Janet Ashford is a free-lance writer and designer based in Solana Beach, California.

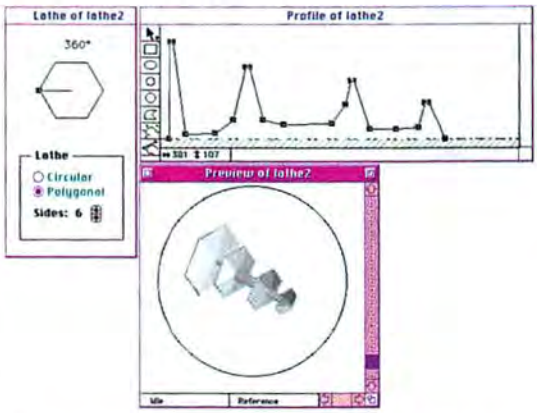
The back cover of Seattle Art's 1992 catalog is a stunning ColorStudio image of a virtual-reality world. The focal point is a 3-D sculpture created with Ray Dream Designer's lathing, extruding, and solid-texturing features.



1 Creating a Round Lathe

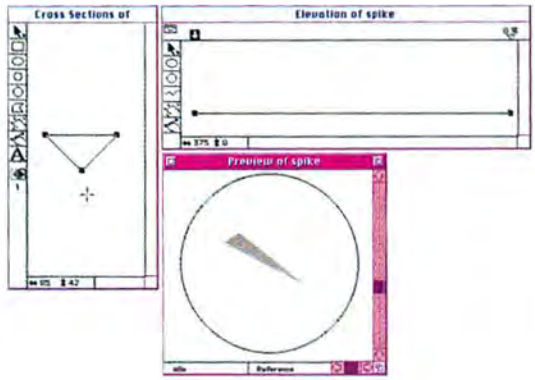
The 3-D sculpture looks complex, but it's actually made of two simple lathed objects that were created with the LightForge module. To create a round lathed object, a 360-degree circular lathe is specified in the Lathe window. Then the polygon tool is used to place a series of points in the Profile window. As each point is placed, the electronic "lathe" whirs away, providing a continually updating preview of the object.

2 Creating a Polygonal Lathe



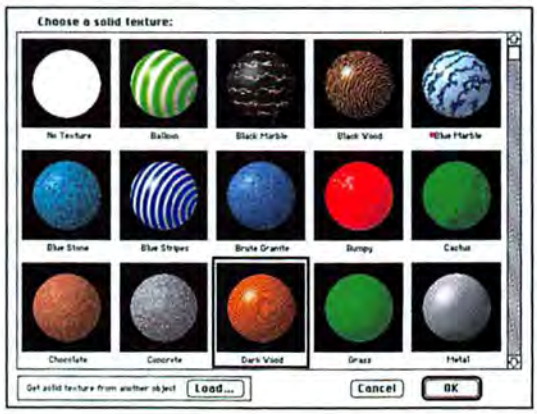
To create the second object, a six-sided polygonal volume is specified, and the polygon tool is used to place a new set of points in the Profile window. Neither object has a texture or a color, so the previews are in gray-scale mode. When texture and color attributes are applied (see Figures 4 and 5), the previews will be updated to show them.

3 Extruding a Spike



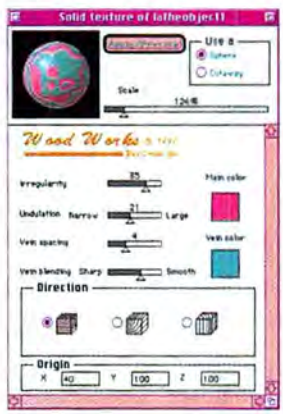
The spikes that poke out from the sculpture are created in an easy three-step process, with Extrusion as the object type. The process is similar to creating a Lathe object. First, the shape is defined by use of the polygon tool to draw a triangle in the Cross Sections window. Second, Brice defines the path for the extrusion by drawing a line segment in the Elevation window. Third, the extrusion is scaled with the Cross Sections ruler from 100 percent at the left end to 0 percent at the right. This means that as the triangle is extruded, its size will steadily shrink to zero.

4 Choosing a Solid Texture



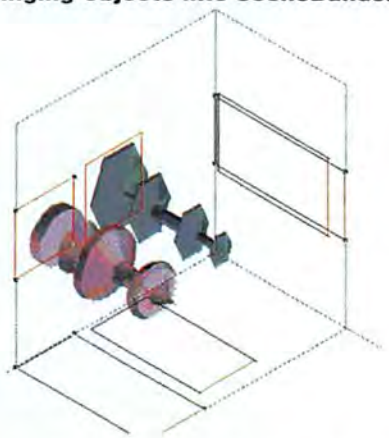
Once a Lathe or Extrusion object has been created, colors and patterns can be applied to either the surface or the entire object. To add a colorful swirling pattern to the round lathed object, Brice first chooses a wood texture from Ray Dream Designer's library of solid textures. The library contains six families of solid textures — including wood, marble, checkers, and wires — and they can be applied to an object as a whole, independently of its surface. Thus, wood veins and textures run through the thickness of the object, as if it were actually made of wood.

5 Editing a Solid Texture



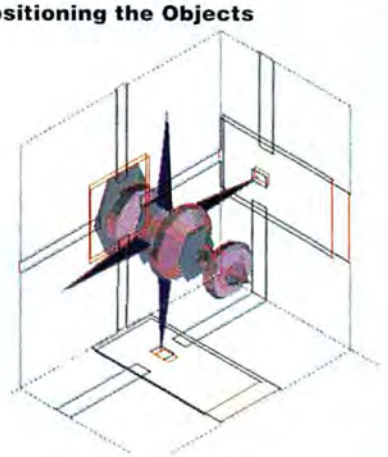
The selected wood texture is customized in the Wood Works dialog box. The irregularity, undulation, vein-spacing, and vein-blending values are increased, and the scale is reduced slightly. Brice changes the wood's colors from browns to blue and pink by double-clicking on the color squares, which brings up a color-wheel dialog box. The color preview of the texture is constantly updated to reflect the changes. Brice also edits and applies a blue-and-purple wood texture to the polygonal lathed object. A striped wood texture in blue and black is applied to the extruded spike.

6 Bringing Objects into SceneBuilder



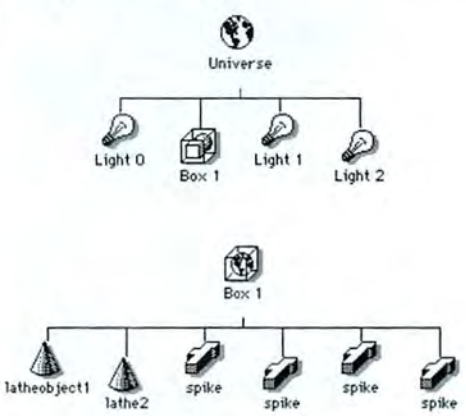
Objects created in LightForge are assembled, lighted, and rendered in SceneBuilder. A SceneBuilder document has two main windows: Perspective and Hierarchy. The Perspective window is the fundamental view; it contains a roomlike representation of the "universe." To assemble the sculpture, Brice places the round and polygonal lathed objects in the Perspective window by dragging their icons from an Objects window (where they've been loaded from LightForge). The rectangular shapes on the three planes of the universe are projections of the objects as seen in those planes.

7 Positioning the Objects



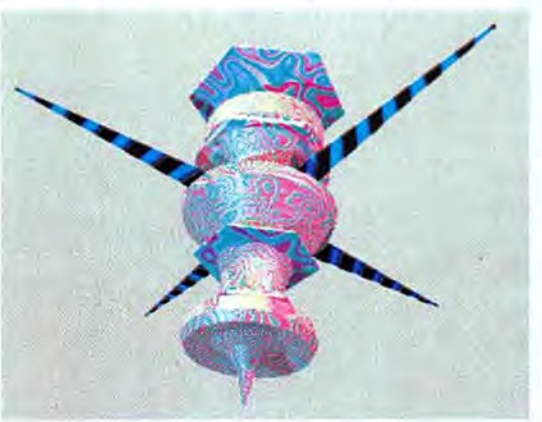
Three-dimensional magic happens when the two lathed objects are dragged into the same position. Brice simply drags the *z*-plane projection (the floor of the room) of the round lathed object until the two projections are on top of each other. Now the two objects interpenetrate, producing a single complex object that has rounded as well as straight-edged sides and contains different texture and color patterns. The spike is loaded and duplicated, rotated, and positioned around the lathed objects.

8 Grouping the Objects

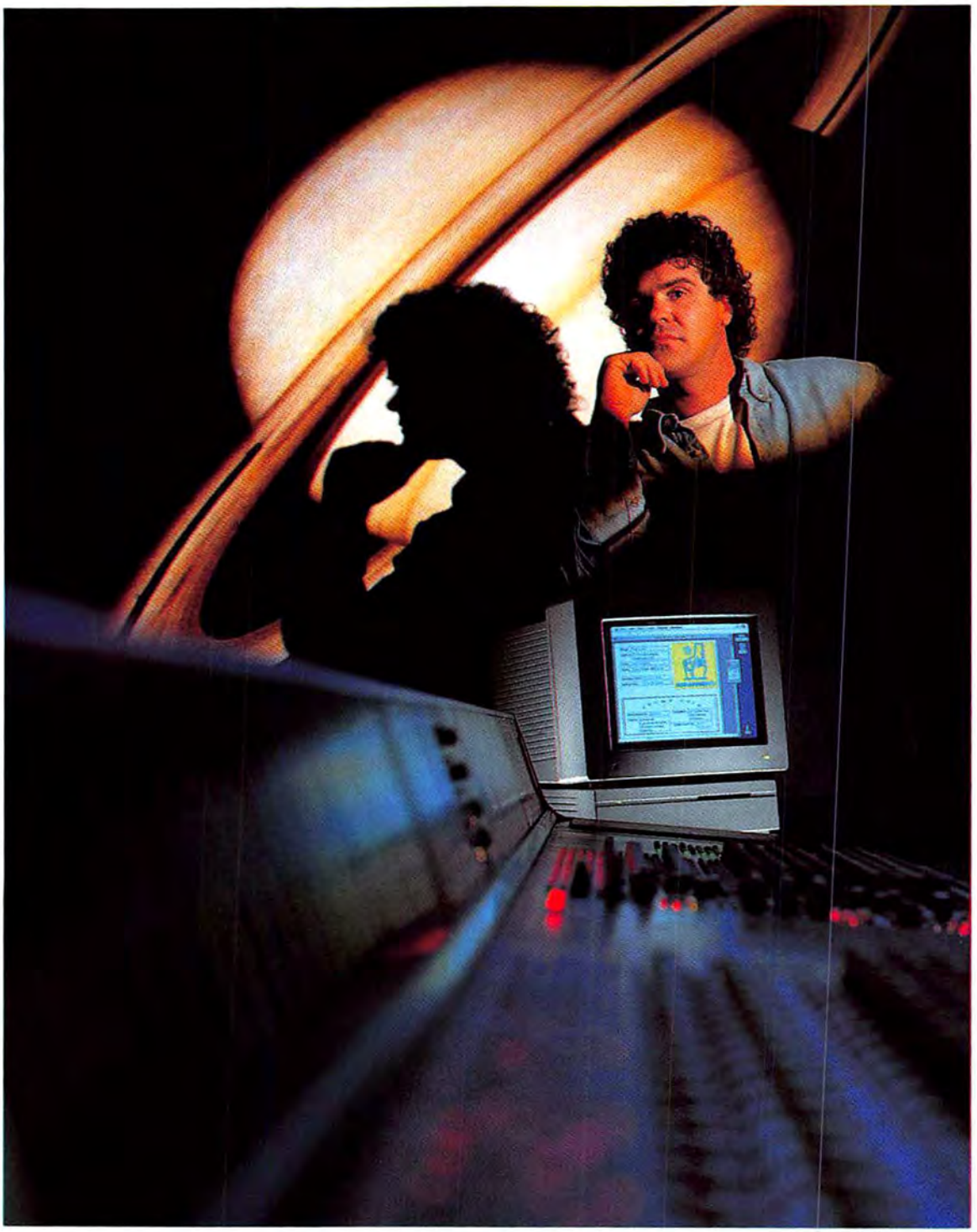


All of the sculpture's elements must now be grouped so that they can be rotated as a single object. This is easy to do in the Hierarchy window, which presents an iconic representation of the universe in tree form (top). Brice groups the components by dragging them into a "virtual bounding box" (Box 1). Double-clicking on Box 1 ungroups the objects and displays their individual icons (bottom). Light sources are added to the universe via the light-source icon in the Hierarchy toolbox. (Light-source parameters are editable.) Light sources also appear in the Perspective window, where you can position them by dragging their projections in any of the three planes.

9 Rotating and Rendering the Sculpture



Back in the Perspective window, the grouped sculpture is rotated into a vertical, slightly tilted orientation by dragging the object's projections with the rotation tool. After checking a draft rendering, Brice renders the finished sculpture with ray tracing at a resolution of 300 dpi, which takes about an hour. The image is saved in PICT format and opened in ColorStudio, where it's resaved as a TIFF file. The 3-D sculpture is then selected, copied, and pasted into the final ColorStudio image (see the opening illustration).



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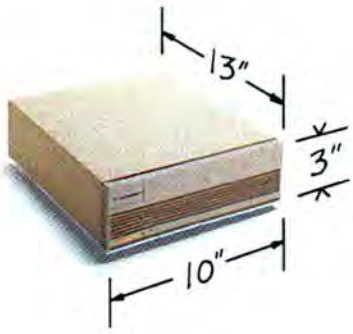

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By Henry Bortman

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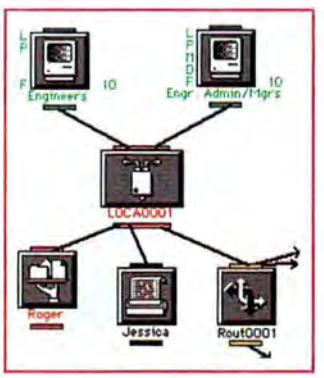

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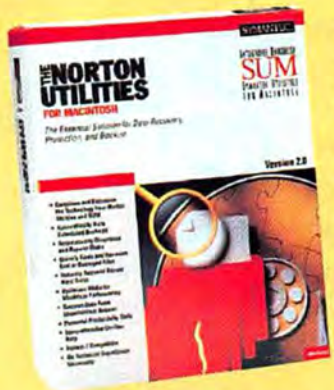

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Improve performance and make any drive System 7 compatible. Powerful, easy to use, affordable version of FWB's acclaimed utilities that format and partition all popular SCSI hard drives, removable and optical drives. Password protection secures your files and extensive diagnostic testing ensures data integrity. Allows high performance driver updates on most devices without reformatting (Ideal for company-wide standardization). **Publisher: FWB, Inc. UTI0299**

$49

Versa Term-PRO 3.6 or VersaTerm 4.6*

VersaTerm-PRO 3.6 and VersaTerm 4.6 emulate the following terminals: DEC VT220 and VT100, DG D210 and D211, plus Tektronix 4014 and (with Pro only) Tektronix 4105. They support multiple-sessions via the Apple Comm Toolbox, and come wtih a complete set of tools and INITs: MacTCP (TCP/IP), Telnet and FTP (Client & Server), SLIP (Serial Line Internet Protocol), LAT (DEC VMS Ethernet), ADSP (AppleTalk Data Stream Protocol), plus serial and modem tools. File transfer capability includes: FTP, XModem, YModem, and Kermit. Both products support System 7.0, and work over LocalTalk, Ethernet or serial connections. **Publisher: Synergy Software**
Versa Term Pro 3.6 **COM0003 $177.**

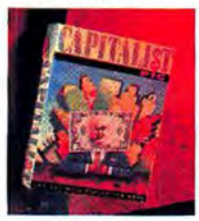
Versa Term 4.6 **COM0002**

$90*

NEW

Capitalist Pig

New! Animated business simulation game challenges you to build and run your own business under authentic economic conditions. Experience the challenge of business, scandals, fires, terrorists, and more, as you battle for billions—or bankruptcy. Make crucial business decisions every minute, and enjoy the results—or suffer the consequences. Packed with sound, animation, and fun, it draws rave reviews from would-be entrepreneurs of all ages. Capitalist Pig is the must-have "Game of the Year". You never knew business could be so simulating! **Publisher: Pluma Software ENT0447**



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WindoWatch

Track the hours you spend on a project with WindoWatch. It's a must for professionals who bill their services by the hour (or minute). WindoWatch operates in the background, automatically generating a timesheet as you work. Use WindoWatch to collect and merge timesheets from team members over the network or export timesheet information to a spreadsheet. Don't miss any opportunity to accurately bill your clients. After all, time is money.
Publisher: ASD Software UTI0264

$89

NEW

StuffIt Deluxe 3.0 or StuffIt SpaceSaver*

StuffIt Deluxe 3.0 is the "Complete Compression solution". Only StuffIt Deluxe 3.0 can solve all your compression needs from archiving to transparent compression and includes StuffIt SpaceSaver. StuffIt Deluxe 3.0 is the fastest most efficient compression product available. Our new Add Match intelligently stuffs only the files that meet the criteria that you specify. **UTI0302 $69.**

StuffIt SpaceSaver

Unlike other compression products, ***StuffIt SpaceSaver*** increases disk space (with lightning speed) without effort on your part. Have it work while your Mac is idle or when you say " Compress this for me." SpaceSaver provides complete on-the-fly compression in one package. SpaceSaver is also one of the least expensive, most productive and easiest to use compression products available.
Publisher: Aladdin Systems, Inc. UTI0303

$35*

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POWER USER'S TOOL KIT 9.0

NEW! With Bonus Software for System 7 Users!

Power User's Tool Kit 9.0 is full of useful productivity enhancers and software to protect your data from viruses. A powerful collection of 6 programs, the Tool Kit 9.0 includes 2 programs designed to take advantage of System 7*. Here's what awaits you...

Carpetbag makes resources, (fonts, sounds, FKEYS, keyboard layouts), available on your Mac without having them installed in your System file.

The Complete Delete overwrites space on a disk where a deleted file was and makes any sort of snooping in your deleted files impossible.

Disinfectant 2.8 can prevent, find and eradicate all of the newly discovered Mac viruses.

Ram Preserves automatically and consistently loads any Mac RAM disk with selected files each time you start up.

Alias Director is the most powerful System 7 alias management tool available.

TrashMan automatically deletes files from your Trashcan after they have aged as long as you specify.

** All Software works with System 7, two programs are designed to take advantage of its new features.*

The Power User's Tool Kit 9.0

is ***FREE*** when you order from MacWAREHOUSE. You pay only $1.50 for shipping and handling. If you would like the disk, please ask for Item #AAA0022.

Some of the programs are Shareware,so you can try them free of charge. To continue using them, some authors ask that you pay a small fee ($5-$10). Two of the programs are absolutely FREE! The details are explained on the disk, which is yours to keep, with our compliments.

NEW

CPU Connectix PowerBook Utilities

Put more power into your PowerBook!

❶ Get even more from your PowerBook with Connectix PowerBook Utilities (CPU), the first software utility created exclusively for your PowerBook. CPU extends your battery life! That keeps your PowerBook up and working longer. CPU protects your sensitive data whether your PowerBook is running, shut down or asleep. Custom menu bar displays show accurate battery level, remaining battery life, date and time. CPU gives you much more. Instant sleep and wake, LCD screen saver, keyboard shortcuts, cursor finder, mouseless menu control and over a dozen other enhancements make your PowerBook more effective. Get the power of CPU and put more power into your PowerBook today. **Publisher: Connectix UTI0297**

$49

Wallpaper

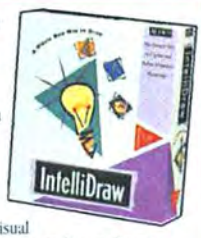
❶ Put some pizazz on your monitor and watch it come to life. With the prize winning Wallpaper decorator program for your desktop, you can jazz up your screen with large patterns (up to128x128 pixels square) in up to 256 colors per pattern, grayscale or black and white. Includes hundreds of desktop patterns, or create your own with Wallpaper's expanded tools. Just drag and drop patterns into place and try creation after creation. You can set Wallpaper to change patterns among your favorites and can create new patterns from any format. It's fun!

Publisher: Thought I Could
GRA0302

$37

NEW

IntelliDraw



❶ Aldus IntelliDraw defines an exciting new category of drawing program, with intelligent features that give you an easy new way to visually experiment, refine, and draw your ideas. Innovative smart tools link graphics in your drawing so they respond to changes automatically. Create visual "what-if" scenarios with features like intelligent clip art & templates, automatic symmetrical objects, and dimension lines. Auto-alignment, shape blending, powerful text handling capabilities, unlimited layers, color gradients, standard draw tools and more.

Publisher: Aldus
GRA0354

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MUK2

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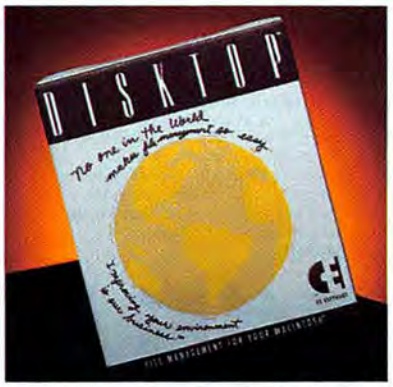

DiskTop goes System 7!

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UTI0048

$63

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CE SOFTWARE

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Manufacturer: Sophisticated Circuits
PowerPad with QuicKeys2 **INP0233 $119.**

PowerPad **INP0232**

$79

Business Plan Toolkit 4.0

❼ Use Business Plan Toolkit to build plans you'll be proud to present to banker, buyer, or boss. It's complete with prompted textwriter, and good estimates of cash flow, P&L, ratios, sales, personnel plan, fully-linked financials, and business charts all clearly explained in a manual that MacUser called, "excellent". Business Plan Toolkit takes you step-by-step with your own words. Supports Microsoft Excel, Works, WingZ, Resolve, and most Mac word processors. System 7.0 compatible. Rated 4 1/2 mice by MacUser. **Publisher: Palo Alto Software**
FIN0116

4½ mice **$99**

FileGuard

❼ "It's about as much software-based security as you can get in one package." MacUser, March 1992. Protect your hard drive from unauthorized access (including security bypass with a system diskette), copying and erasure; applications and file/folders (including System folder) from unauthorized access, deletion, and/or illegal copying; desktop from alterations by unauthorized users. Keep an eye on System usage with FileGuard's Users Log which continuously tracks user/group activity. System 7.0 Compatible. **Publisher: ASD Software Single**
UTI0135

5 mice **$139**

After Dark/More After Dark Bundle*

❼ After Dark 2.0 displays over 35 screen savers including the classics, such as Flying Toasters and Fish!. Also features sound, password protection, MultiModule, logo and message display. **UTI0119 $29.**

❼ It's M.A.D.! It's ***More After Dark*** - Over 25 incredible displays for After Dark, the Ultimate Screen Saver. Features contest winners; Mowin'Man, Tunnel, GraphStat, many beautiful new Fish!, Kittens, Art Museum, and Lunatic Fringe game module help save you screen form phosphor burn-in. (Requires After Dark.)
Publisher: Berkeley Systems UTI0230 $25.

More After Dark Bundle

Buy both and save.
UTI0231

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TouchBase 2.0 or DateBook

TouchBase 2.0 stores information about personal and business contacts. Automatically capitalizes words and formats phone numbers. It has fields for storing alternative phone numbers, and you can customize the fields. TouchBase prints envelopes and mailing labels, including postalbar codes, plus many other useful forms. **DAT0076**

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TouchBase and Datebook Bundle **BUS0253 $129.**
Publisher: After Hours Software

Datebook
BUS0222

$79ea.

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Bridge 6.0

❼ Now you can play a rubber of Bridge 6.0 with the Mac's three players. Bid with either the Stayman or Blackwood conventions. Bridge 6.0 handles all the bookkeeping and tactfully informs you of any mistakes in bidding or play. **ENT0303 $29.**

Grail Quest

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Publisher: Artworx
ENT0262

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Publisher: MicroMat UTI0285

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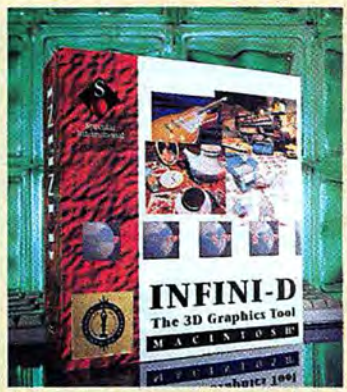

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Publisher: Specular International GRA0303

$645

MacPrint 1.3

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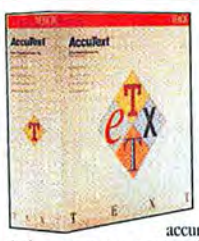
$95



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❼ Enhanced accuracy through Verification. AccuText 3.0 is Intelligent Character Recognition (ICR) software that allows scanned documents to be recognized and captured to electronic files. Accutext's interactive Verifier increases speed and accuracy by inviting user interaction before processing. AccuText features include System 7 compatibility, format retention, automatic halftone removal, on-screen zoning, support for ten languages, and compatibility with most popular scanners and software applications. **Publisher: Xerox Imaging Systems DTP0039**

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❼ Add more than 150 wild and wacky sounds to your Macintosh with Kaboom! Each sound can be played every time you start up your computer, insert a disk, empty the trash, and more! Amaze your friends with the sounds of traffic jams, screams, and ringing phones-even famous dialogue from "Twilight Zone," "I Love Lucy," Ronald Reagan, and more! With Kaboom! you'll never have to settle for a simple "beep" again! **Publisher: Nova Development Corporation UTI0281**

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eXodus

eXodus™ 4.0

❼ eXodus™ 4.0 window display software package enhances the friendly Macintosh environment by giving full X server capabilities to users running either Mac OS or A/UX. It runs on all Macs with at least 2MB of RAM-Classic to Quadra-is System 7 and Multifinder compatible. Comes complete with all networking software required for DECnet, TCP/IP, and AppleTalk connections and provides built-in FTP file transfer support. It fully supports the ICCCM standards, allowing users to copy and paste text and graphics between the Macintosh and X environments, and offers a variety of printing options. Monochrome as well as color X screens are supported with three window management options: Rooted (remote), and Rootless (Macintosh or MOTIF). All you need beyond eXodus is a Macintosh with a network connection!

Publisher: White Pine Software COM0118

$189

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❼ The most comprehensive lottery software package and NOW works with the new "Powerball" games and Pick-5, Pick-6, and Pick-7 lotto games. Choose up to 80 numbers, analyze and choose numbers from past drawings, create tickets through wheeling, record bets to check for later winners, and print charts-All to help you beat the odds. Comes with the FREE audio cassette, Lottery Winning Strategies and a FREE lottery database of the last 12 months winning numbers from the state of your choice when sending in an enclosed card.

Publisher: Triad Publishing, Ltd. ENT0401

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Crossword Creator

❼ Create crossword puzzles quickly and easily on your computer. Just type in the words and Crossword Creator will instantly generate the puzzle. Build your own dictionaries and use them for future puzzles. Includes Roget's II, The New Thesaurus, with wild card search features. Save options include desktop publishing files. **ENT0440 $39.**

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To upgrade a 4-socket Mac Plus or SE to this amount of memory	Do this: (Install in multiples of two only) SIMMs must be 150ns or faster
2 MB	Remove all four existing 256k SIMMs, install two 1 MB Simms, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256k SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four 256k SIMMs with four 1 MB SIMMs.
To upgrade a 2-socket Mac Classic II or LC to this amount of memory	**Do this: (Install in multiples of two only) SIMMs must be 100ns or faster**
4 MB	Install two 1 MB SIMMs
To upgrade a 2-socket Mac LC II to this amount of memory	**Do this: (Install in multiples of two only) SIMMs must be 100ns or faster**
6 MB	Install two 1 MB SIMMs.
To upgrade a 8-socket Mac II, IIx, IIci, IIcx or SE/30 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 120ns or faster**
4 MB	Remove all four existing 256k SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256k SIMMs, install four 1 MB in remaining sockets.
8 MB	Remove all four 256k SIMMs, install eight 1MB SIMMs
To upgrade a 4-socket Mac IIsi to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 100ns or faster**
5 MB	Install four 1 MB SIMMs.
To upgrade a 4-socket Quadra 700 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 80ns or faster**
8 MB	Install four 1MB SIMMs.
To upgrade a 16-socket Quadra 900 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 80ns or faster**
4 MB	Install four 1MB SIMMs.
8 MB	Install eight 1MB SIMMs.
12 MB	Install twelve 1MB SIMMs.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100ns chip. The original Mac used relatively slow 150ns memory chips. The 68020 processor needs 120ns (or faster) chip, and the 68030 Macs like the speedier model.

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7 GREAT REASONS

1 Finder 7

The new Finder 7 is worth the cost alone. Access, organize, and view your folders, documents and applications faster and easier with the new improved finder.

2 Balloon Help

Use the new Balloon Help for interactive help while you work. Turn this feature on and point to anything on your screen - a menu item, icon, or tool - and a "balloon" appears, telling you what it is and what it does.

3 File Sharing

With the new File Sharing features you can share hard drives, folders, and files, with others on your network; it has never been easier. You can even set passwords so that only specific individuals or groups can see your files and work with them.

4 Fonts in System 7

Apple's new advanced font technology gives you clear, crisp type on screen in any size plus the ability to print to many different kinds of printers. No more struggle with font compatibility.

5 Multitasking

With System 7 Multitasking is always optional. Now you can run multiple applications at the same time, and switch from one to another with a click of the mouse. System 7 also supports background processing, so that while you're working in your word processor, you can print a document and have your spreadsheet recalculating.

6 System Folder Simplicity

Apple has completely redesigned and improved the System Folder, making it much easier to organize. Predefined subfolders are created automatically, to reduce clutter. The new System Folder includes a Control Panel Folder, Extension Folder, Apple Menu Folder, Preference Folder and Startup Folder.

7 Publish and Subscribe

You can "publish" any part of your document (a graphic, chart or piece of text), to another document even in another application - which "subscribes" to the original. Any changes you make to the original document will automatically appear in the other, even across a network. Now that's live copy and paste!

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Video, sound, and animation on your Macintosh

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GRA0347

Publisher: Apple Computer, Inc.

$169

Macintosh PC Exchange

Open PC files on 3.5" MS-DOS and Windows-formatted floppy disks. Read DOS files on your Mac desktop. Open, save, rename, move, copy and delete documents just as if they were Mac files! Customize the program for even faster access. Requires Apple SuperDrive or compatible.

COM0126

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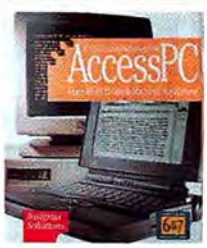

With AccessPC 2.0, your Macintosh can make MS-DOS files look just like Mac files, instantly. Pop any DOS floppy in your drive, and in a couple of clicks, the PC files are on your Mac desktop, looking and acting perfectly Mac-like. Edit, copy, save, print, play with the numbers, print again, and give the PC people back their diskette. It's that easy to use any PC file in any Mac application.

AccessPC is an easy-to-install control panel utility that's always been completely compatible with System 6 & 7.

Publisher: Insignia Solutions
UTI0174

$60

DiskFit Pro

Fast, efficient, easy backup

For Finder-readable backup to floppies, cartridge or other hard disks, get DiskFit Pro. DiskFit Pro copies files from a hard disk to a "SmartSet" of floppies, and then updates that "SmartSet" with each subsequent backup. By replacing only the obsolete files in the backup set, DiskFit Pro keeps your SmartSet from growing every time you back up. Backups stay fast and backup sets compact. And since files stay in Finder format, retrievals are a breeze. Don't leave your data at risk, backup with DiskFit Pro. System 7 Savvy, System 6.x compatible.

Publisher: Dantz Development
UTI0246

$74

SAM 3.0 or NUM 2.0*

SAM 3.0 detects viruses by monitoring the suspicious activities that characterized them. Version 3.0 has enhanced update and repair capabilities, faster scanning, and more. The CDEV portion operates during normal Mac usage, and offers a number of options for checking disks and folders as you work. **UTI0214 $65**

NUM 2.0 combines and integrates two outstanding collections of Mac utilities: SUM 2.0/NUM 1.1 plus automatic backup, data security (both DES and FasCrypt), and many productivity enhancements. Other utilities recover lost or accidentally deleted files, restore crashed hard disks and more. **Publisher: Symantec**
UTI0151

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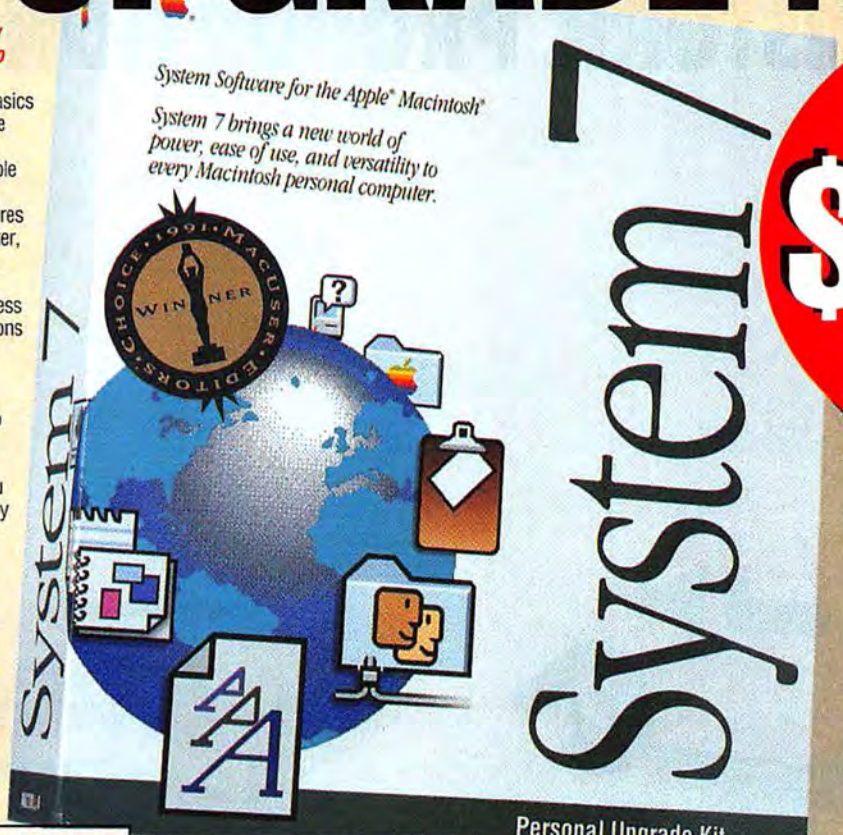

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System 7 Group Upgrade Kit
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Gain direct access to information and resources from your AppleTalk network. Simple to set up and use. High performance is optimized for a broad range of modems. Provides multiple security levels, and requires only System 7 and a high-speed modem. No special hardware required. **COM0131** *Publisher: Apple Computer, Inc.* **$175**

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MUK2A

UserLand Frontier

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Publisher: UserLand Software
UTI0272

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Publisher: Salient
UTI0179

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Publisher: Microsoft
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SNMP: Not So Simple

Simple Network Management Protocol? Some might call this phrase an oxymoron, but SNMP has become the holy grail for vendors of networking products.

By Kurt VanderSluis

The word *simple* can be deceptive. The *simple* in Simple Network Management Protocol (SNMP), for example, might lead you to think it's a protocol, or set of rules, for simple network management. In fact, SNMP is a simple *protocol* for network management — so simple that its command language includes only four verbs. Because it's being promoted as *the* standard for management of devices on AppleTalk networks — and on foreign networks, such as TCP/IP — SNMP should simplify the process of network management in some ways as well. However, as with most standards, attaining simplicity in one area can involve complicating others. Because routers have been a leading area of SNMP implementation, we'll look at some current router-management strategies to discover SNMP's advantages as well as its limitations.

SNMP at First Glance

First, some advantages: Consider a network manager who uses AppleTalk routers from several vendors — for example, a mixture of Cayman GatorBox CSs, Shiva FastPaths, Compatible Systems Ether•Routes, Cisco AGS Modular Routing Systems, Novell NetWare 3.11 file servers (with a built-in software router), and Engage SyncRouters. Today, managing each of these routers requires different software. Although all the routers let a network manager configure the network number ranges and zone names, each requires a different command language for this process. There are also many differences in the types of information each router can report. For example, a Novell router reports the time it noticed a discrepancy in the network numbers advertised by another router, and a GatorBox CS doesn't. However, a GatorBox CS can tell you its free memory on demand, whereas a FastPath can report this information only indirectly, by posting it to a log file every ten minutes.

In the future, all these routers will employ the same SNMP commands and report the same core information, despite their individual differences in user features and performance. A network manager will be able to sit down at a Macintosh, fire up an SNMP application, and use it to check or change the configuration of any or all the routers on the network, regardless of which vendor they came from.

Although SNMP can potentially give a network manager far-reaching control over a network, the SNMP approach is not without problems. In its current state, SNMP has limited provisions for the authentication of the network manager; it provides the same level of control to virtually anyone who can use an SNMP application. Without the appropriate safeguards, a few ill-chosen SNMP commands can easily throw a stable network into massive confusion and disorder.

These security issues (and a few other unresolved issues) have delayed the widespread

implementation of AppleTalk SNMP standards by vendors of routers and other network devices. Nonetheless, Neon Software (1009 Oak Hill Road, Suite 203, Lafayette, CA 94549; 510-283-9771) has introduced a useful application, RouterCheck 2.0 ($895), that manages the few vanguard routers that support SNMP while continuing to manage other routers that don't. RouterCheck uses the emerging SNMP standards and adroitly skirts the security issue by letting you monitor network parameters but not change them (similarly, most hardware vendors are leaving out the ability to change the settings on their SNMP-compliant devices until the proper security safeguards are in place). To understand how RouterCheck is using SNMP, let's first take a closer look at what SNMP is.

Inside SNMP

Like all protocols, SNMP is a set of standards and conventions for communication — in this case, for communication of network-management information. In the SNMP model, communication takes place between *Consoles* and *Agents* (see Figure 1). A Console is software that the network manager runs, whereas an Agent is software that runs continually on a networked device and waits for commands from the Console. The Agent manages a set of data objects relevant to the device — for example, the name of the network zone in which the device is located — and retrieves or changes the objects' values in response to Console commands.

To make this communications model work, the AppleTalk working group of the IETF (Internet Engineering Task Force) has specified three components of SNMP: the command language, the data-object definitions, and the transport mechanism.

Command Language. The command-language component of SNMP governs what types of commands you can send to network devices, how you have to structure them, and how the devices must reply. The two central commands of SNMP are the Get command, which asks a device to report the value of a specific data object, and the Set command, which asks a device to change the value of a data object. A third command, Get Next, lets you get the value of the next object in the data definition without specifying the object's name. The remaining command, Trap, is for communications initiated by the device's Agent.

Although much of what SNMP will offer must wait until the AppleTalk standards are more fully developed, SNMP is usable now in the form of RouterCheck 2.0.

Data-Object Definitions. The second component of SNMP defines which aspects of a network device can be monitored or controlled. This definition is called a Management Information Base, or MIB, and it's defined differently for different network protocols.

The AppleTalk MIB defines 8 separate *groups* of management data with several *data objects* in each group (the AppleTalk MIB+, still being developed at press time, has 13 data groups and expands the SNMP data definitions to include many types of devices besides routers). Each group corresponds to a particular type of AppleTalk function (specifically, functions that are performed in a particular layer of the AppleTalk-protocol stack). For example, the ZIP (Zone Information Protocol) group contains objects — such as the `zipZoneName` object — that relate to network locations within zones.

Another group, the DDP (Datagram Delivery Protocol) group, contains objects — such as the `ddpOutNoRoutes` object — that relate to information delivery among nodes. Whenever a Get command asks a device for the value of its `ddpOutNoRoutes`, the device replies with the number of packets it threw away because it was unable to figure out how to route a packet to the appropriate destination. If a router is asked by a confused device to send a packet to a nonexistent address, the router will throw that packet away and increment the value of its `ddpOutNoRoutes` counter by 1. A higher-than-normal value of `ddpOutNoRoutes` for a particular router can tell a network manager it's time to look for the source of the confusion.

Transport Mechanism. The final component necessary for AppleTalk management with SNMP is the transport mechanism — that is, the specification of how to transport SNMP information between a Console and an Agent by using AppleTalk. This specification defines what type of packets are used, how they are structured, and so on. SNMP has been closely associated with TCP/IP protocols from its inception, because these were the protocols SNMP first used to transport management information. Ordinarily, most AppleTalk devices don't use TCP/IP protocols, and it would be undesirable to have them begin using TCP/IP just for the sake of SNMP management, so the SNMP specification has required extensive rewriting for AppleTalk.

Figure 1: SNMP Agents at Your Command

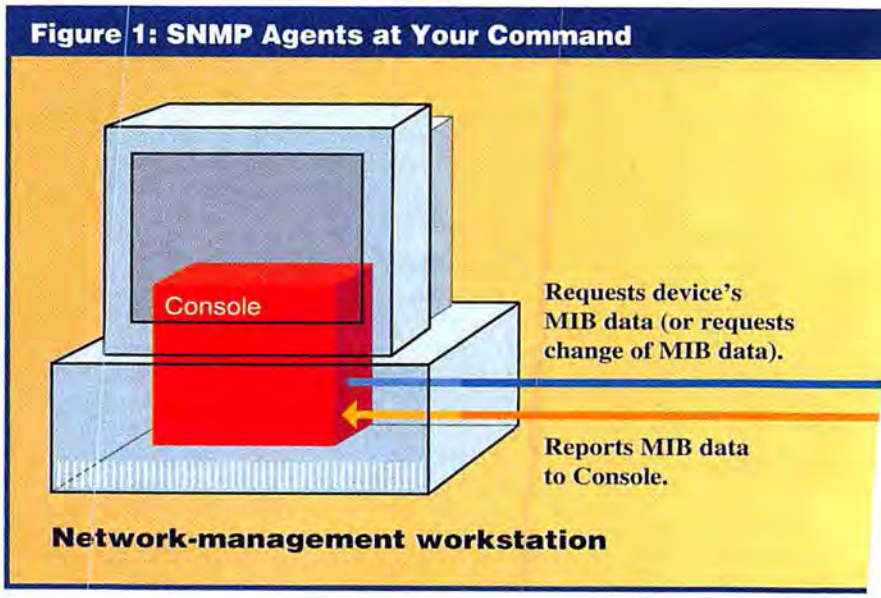


Figure 2: Which Tells You More, AppleTalk or SNMP?

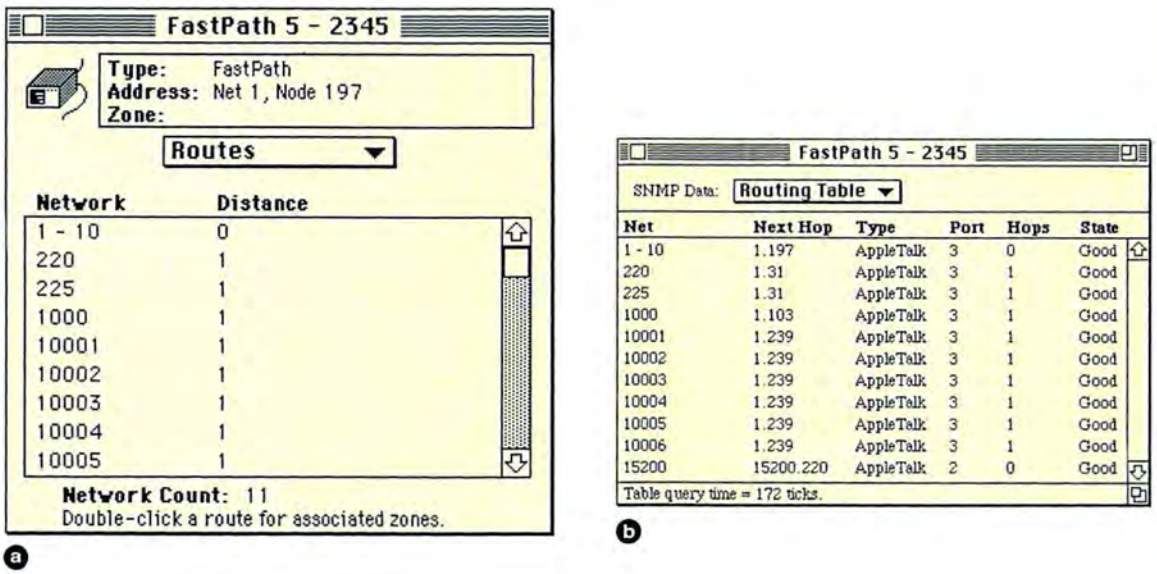


Figure 2: We had Neon Software's RouterCheck ask a Shiva FastPath 5 router for routing information, using a standard AppleTalk query (a) and using SNMP data retrieval (b), to show how much more information the SNMP method can retrieve.

SNMP in Practice

Although much of what SNMP will offer must wait until the AppleTalk standards are more fully developed, SNMP is usable now in the form of Neon Software's RouterCheck 2.0. RouterCheck is able to retrieve information from routers either by using standard AppleTalk protocols or by acting as an SNMP Console (you choose which type of information retrieval you want by clicking on the appropriate button).

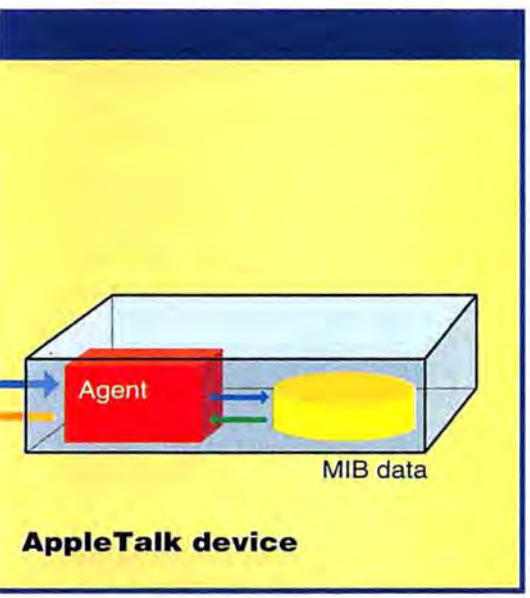


Figure 1: In the SNMP model, to access and change device information, the network manager runs a software Console that communicates with software Agents running on network devices. The Agent manages a set of data objects relevant to the device, which are defined by the SNMP MIB (Management Information Base). SNMP also specifies the language and the transport mechanism for Console/Agent communication.

In addition to offering these two management methods, RouterCheck can mimic the proprietary command languages of several of the major vendors' routers. This capability makes it a good transition product; as the SNMP standards continue taking shape, you can choose which management method best suits your network's needs. At press time, only a few router manufacturers had incorporated an SNMP Agent into their software. Although the rest have committed to meeting the specifications of the AppleTalk MIB in near-term releases, it will probably be mid-1993 before every router on your network can be fully SNMP-capable.

RouterCheck is designed to perform a single job: router management. The choice of such a narrow focus is probably wise, because general-purpose SNMP Consoles (such as InterCon's WatchTower, which works only over TCP/IP) can be cumbersome to use. It's best if a Console has a highly developed knowledge of the structure of the MIB the network manager is interested in before any data retrieval begins. With this knowledge, the Console is able to intelligently translate high-level user requests (such as "What errors has

this device experienced?") into the correct SNMP commands. In SNMP, a typical Get command retrieves a single data object. If the Console's knowledge of the MIB is not highly developed, it's up to the user to compose the myriad of SNMP questions required to retrieve the device's data objects.

SNMP's method of gathering information is very different from that of, say, CSG Technologies' Network SuperVisor. The Network SuperVisor equivalent of a Console might send an individual workstation a complex command such as "Give me a list of all of your Chooser extensions along with their characteristics." The Network SuperVisor equivalent of an Agent would then interpret the complex command and reply with all the extension data in proprietary Network SuperVisor format.

In a typical SNMP exchange, a Get command is much more specific; it might say something such as "Give me the file size of the 7th Chooser extension in your list of Chooser extensions." For a device that has a long list of Chooser extensions, in order to obtain the same data retrieved by the single, proprietary Network SuperVisor command, an SNMP Console might need to issue hundreds of Get commands.

A Few Simple Tests

We looked at RouterCheck on a test network that included four routers, two of which (a Shiva FastPath 5 and a Compatible Systems Ether•Route/TCP) were SNMP-capable. (Cayman, the vendor of one of the other routers, was working on full compliance for its GatorBox CS at the time this article went to press.)

Because the SNMP method retrieves more information than the standard AppleTalk command does, it also generates more traffic on the network.

In using RouterCheck to examine the routing table in the FastPath 5, we used two methods. First, we had RouterCheck issue the standard AppleTalk command for getting the list of routes in the FastPath's routing table. This method returned a list of network numbers along with the number of routers that lay between the FastPath 5 and the network. Next, we used RouterCheck's SNMP capabilities to retrieve the data objects in the RTMP (Routing Table Maintenance Protocol) group of the FastPath's MIB. As Figure 2 shows, the SNMP method retrieves much more information than the standard AppleTalk command does.

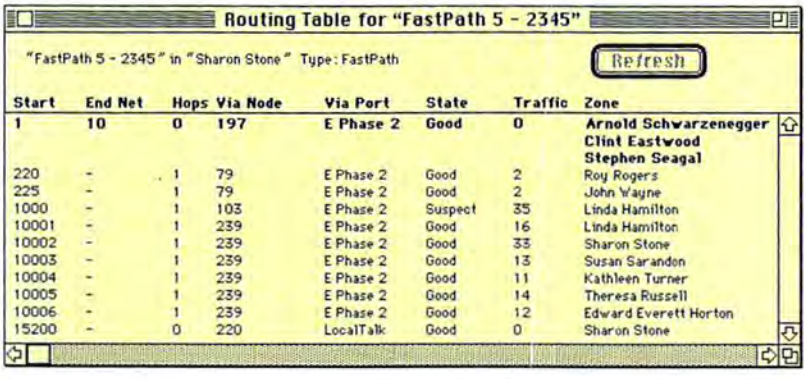
Because the SNMP command retrieves more information, you might guess that it also generates more traffic on the network. Sure enough, with the AppleTalk command, counting both the question and the answer, fewer than 150 bytes of network traffic were needed to describe the 11 networks on our test internet. When we used SNMP to retrieve the routing-table information, more than 13,000 bytes of network traffic were needed. Why so many? Because each of RouterCheck's SNMP questions retrieves one data object and the RTMP group contains seven data objects. To get the routing information for 11 networks, RouterCheck must ask the FastPath 77 questions and receive 77 answers. It took RouterCheck about three seconds to gather, interpret, and display the information. As you can probably imagine, that process could take a fairly long time on an internet with numerous routers.

Let's compare the RouterCheck results with those of Shiva NetManager. This application is designed to work with the FastPath, so you'd expect it to compare very favorably with RouterCheck. In Figure 3, you can see the routing-table information the FastPath returned, using fewer than 600 bytes (2 questions, 2 answers). Despite the lower amount of traffic, the proprietary method also gives more information — it includes the zone information too. NetManager has other advantages; for example, it provides a secure password-protection scheme and can also retrieve log information from the router's memory.

Standard Conclusions

Although it's not entirely fair to compare a proprietary management system with a standard such as SNMP, the comparison illustrates an important truth about standards. Standards are designed to accommodate the widest possible variety of circumstances and, as such, are not optimized for any particular one. Although they can simplify the process of working in a multivendor environment, they can also complicate processes that are more easily performed by a narrowly focused, proprietary system that's optimized for a particular job.

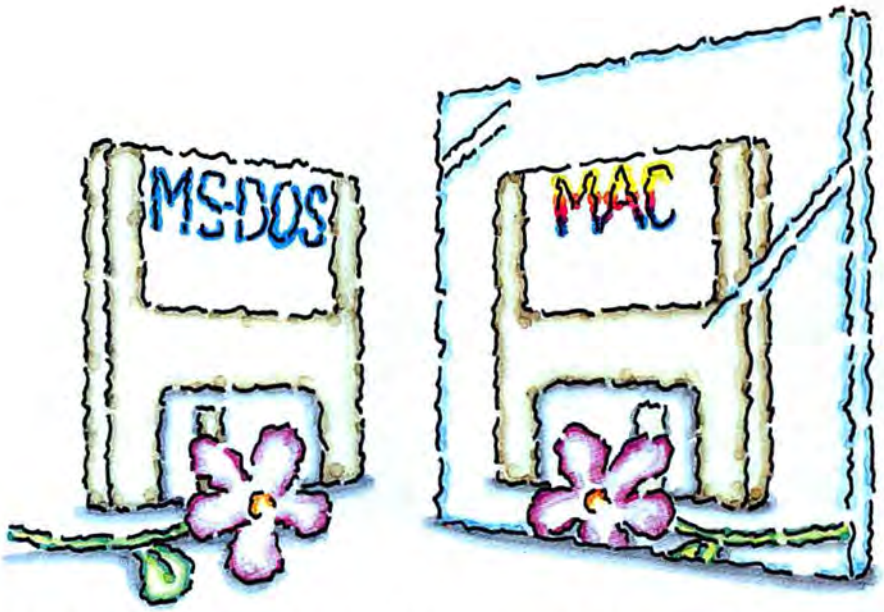
SNMP is an important management standard and is worthy of our use, but we'll continue to have and use proprietary management systems even after SNMP has been widely implemented. The best part about the advent of SNMP is that by establishing a minimum level of management capabilities, SNMP raises the standard for network-management excellence. Vendors won't just need to meet the standard of SNMP — they'll need to compete in how far they can surpass it.



Start	End Net	Hops	Via Node	Via Port	State	Traffic	Zone
1	10	0	197	E Phase 2	Good	0	Arnold Schwarzenegger Clint Eastwood Stephen Seagal
220	-	1	79	E Phase 2	Good	2	Roy Rogers
225	-	1	79	E Phase 2	Good	2	John Wayne
1000	-	1	103	E Phase 2	Suspect	35	Linda Hamilton
10001	-	1	239	E Phase 2	Good	16	Linda Hamilton
10002	-	1	239	E Phase 2	Good	33	Sharon Stone
10003	-	1	239	E Phase 2	Good	13	Susan Sarandon
10004	-	1	239	E Phase 2	Good	11	Kathleen Turner
10005	-	1	239	E Phase 2	Good	14	Theresa Russell
10006	-	1	239	E Phase 2	Good	12	Edward Everett Horton
15200	-	0	220	LocalTalk	Good	0	Sharon Stone

Figure 3: Useful as the SNMP method is (see Figure 2b), it still doesn't retrieve as much information — or retrieve it as efficiently — as does a proprietary application such as Shiva's NetManager, shown here. NetManager is specifically designed to collect information from a FastPath 5 router.

Kurt VanderSluis is president of The Network Group, a training and consulting firm in Seattle.



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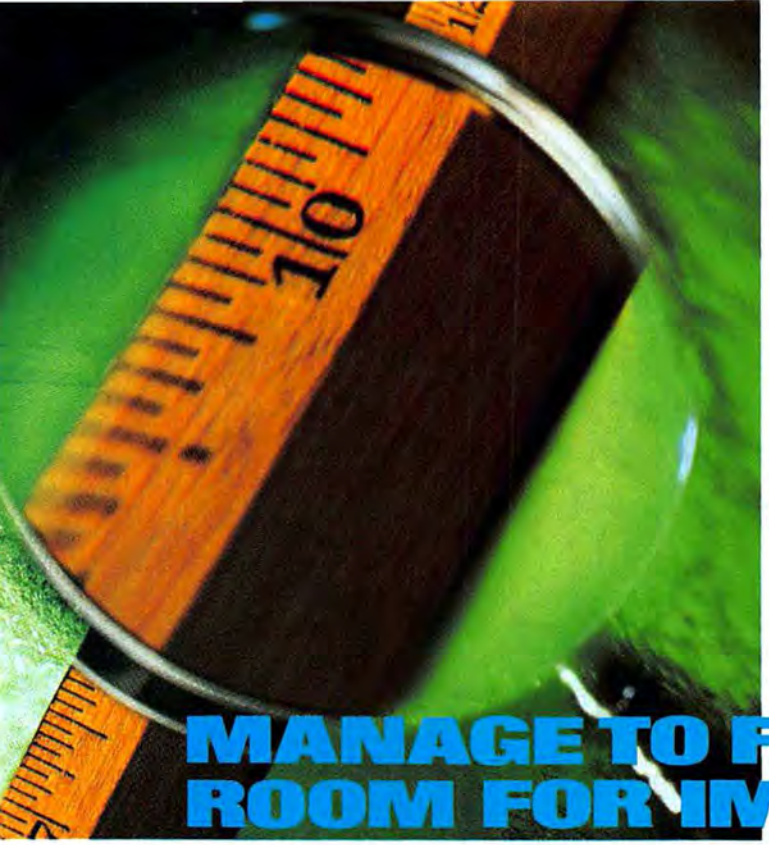

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The days when Mac owners had to defend their computer as more than "just a toy" are past. But suppose you *want* to use your Mac as a toy? Get Paradigm Software's Pearl Controller, a $195 hardware device with which you can connect your Mac to Lego Technics robotic components and build and control your own Lego robots. If anyone gives you a hard time, don't say you're playing with Legos — say you're studying object-oriented programming and basic principles of process control. 617-576-7680.

By James Bradbury

Better days: Following the enormous success of its "Far Side" calendar, Amaze has rolled out additional versions, starting with a $24.95 daily planner based on the "Cathy" cartoon strip. No, it doesn't feature dieting tips, but it does weigh in at a hefty nine floppy disks (that's two more than System 7). But to really indulge your sesquipedalian tendencies, your best bet is the $19.95 Word-A-Day Daily Planner, based on the Random House dictionary. 206-820-7007.

Take my bytes, please: Maybe CD-ROM publishers worry about being taken seriously; it seems that every title in the past couple of years has either had redeeming educational value or been a bone-dry collection of statistics and facts. Even the cows in About Cows looked serious. Now Warner New Media has **broken the humor taboo** with a title called Funny. It's an indexed QuickTime version of a filmed documentary in which a hundred people, ranging from professional comics to folks on the street, tell their favorite joke. For $39.95, you can be the life of the party. 818-955-9999.

Child restraints: Every parent with a Mac knows that keeping the kid away from the computer is as easy as picking ticks off a porcupine. Now EdMark has developed a "childproof" graphical user interface for 3-to-8-year-olds called KidDesk. It isn't exactly pretty, but it's **no uglier than Windows.** Besides being able to play with junior DAs such as a talking clock and a phone-answering machine, kids can launch their own applications and games without accessing the Finder. $39.95. 206-861-8200.

Just for fun: Not long ago, we mentioned that Advanced Gravis' MouseStick was a must for every flight-simulator enthusiast. Now the company is ready with the $99.95 MouseStick II — featuring **more buttons and software smarts** — which should make a joystick easy and practical for everything from Spectre to Prince of Persia. The company's real hot seller, though, ought to be its brand-new $49.95 Nintendo-style GamePad. 800-663-8558 or 604-431-5020. ➡ One company that ought to be happy about better Mac joysticking is Sierra On-Line, which is moving its best-selling games — including its Dynamix division's Red Baron flight simulator ($59.95) — to the Mac. 800-326-6654 or 209-683-4468.

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SE (in black & white)			◆	◆	◆	◆	◆	◆	◆
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SE/30 & IIsi	◆	◆	◆	◆	◆	◆	◆	◆	◆
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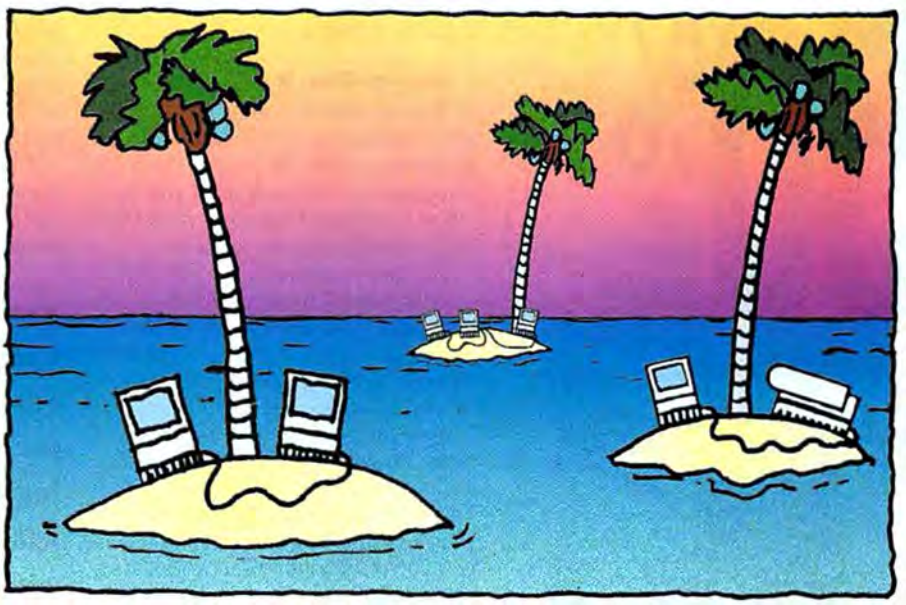
CIRCLE 124 ON READER SERVICE CARD.

Very Personal Networks

One Mac is a computer. Two Macs are a network waiting to happen. It's easy, it's cheap, and it'll make life easier.

By Steven Bobker



The single-Mac household or business is becoming increasingly rare. Users are getting two, three, or even more Macs. Small businesses are prime Mac hot spots, and the day of the single Mac Plus in the owner's office has passed. Add to that the growing popularity of inexpensive, AppleTalk-connectable laser printers, and you've got the formula for an explosion of TANs (tiny-area networks) and TTANs (*truly* tiny-area networks). Building and running a TAN or TTAN is simple, effective, and — best of all — cheap. The benefits more than outweigh the minimal effort involved.

TTANs, which by definition have a two-device, one-cable limit, are easiest to set up. All they do is link a single Mac to a printer or two Macs to each other. More than that, and you're in TAN land. Because you need only a cable to set up a TTAN, the only reason to buy network (LocalTalk or PhoneNet) connectors is if you plan to expand your network someday. Otherwise, just get what is usually sold as an ImageWriter II connecting cable. It normally comes in 6-foot lengths but can also be found in 15- and 25-foot versions. Get the cheapest third-party one you can find. All brands work well for TTAN use. Plug one end in to each device, and you're done.

TANs are a bit more complex. You need a network connector for each device. I'd stay away from the expensive LocalTalk-style connectors and stick with the much less expensive PhoneNet-style connectors, which are available from a wide variety of manufacturers. The most important thing to remember about these connectors is that the tiny, easy-to-lose resistor packs that come with them are important. You need to plug a resistor in to any connector socket that doesn't have a cable plugged in to it.

Down to the Wiring

The perceived problem that keeps many people from building TANs at home or in offices is wiring. Wires need not be a problem. In many households, the existing phone wiring in the walls has plenty of spare capacity for data communication. PhoneNet-style connectors can use the existing phone wiring in your house. Even if your built-in phone wiring has badly placed jacks or is otherwise unsuitable, connecting a small, low-traffic net requires nothing more than buying some inexpensive phone wire. It's easy to install and conceal. Depending on how your location is heated or cooled, you may even be able to use the heating or air-conditioning ducts to carry cabling. We have forced-air heating and easily strung phone wire through it.

Once you've wired the network, you need some way for devices to communicate. Printer drivers, which appear in the Chooser, automatically take care of Mac-to-printer communication. Mac-to-Mac is a bit more complicated. The best advice is to run System 7, which has all the small-network software you need, built right in.

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PERSONAL BEST

Indeed, System 7's personal file sharing is what really makes small networks practical. There's no need for a server or other special software. Once you've turned on the file-sharing components of System 7, you're in business.

Step-by-Step Net

The only trick is starting up. The System 7 manual has all the details, but the presentation could be better. There's a particular order of steps, and if you don't follow it, nothing happens — no sharing of files, no network, no nothing.

The best way to set access privileges on small nets is a bit different than it is on large nets. If the net is in your home or office and you don't need security from unauthorized users, set all privileges on. The sole purpose of restricting access is to make things difficult for unauthorized users. Presumably, you know everyone who's going to have access to your TAN. Too much security can hamper use of your network. The easiest course is to give guests full access everywhere. Then routinely sign on as a guest everywhere. The only thing you can't do is change the privileges of others. You have full access to all files on all mounted volumes.

This means that if you have two Macs in two rooms, you can easily mount onto your own desktop a hard disk or another volume that is attached to the other Mac (the most convenient way is to create an alias for that volume; it'll save you from having to open the Chooser). Suddenly, transferring files back and forth between your Macintoshes is a breeze — no more sneakernet.

You can still set up a TAN if you run System 6, but it's more difficult and requires special software. Going to System 7 is cheaper and easier. You can mix System 6 and 7 in a TAN, but that's a last resort to be used only if some vital software or hardware is, incredibly, not yet System 7-compatible.

Working on Your TAN

Some software tools are available to make using your TTANs and TANs easier. These are not professional network-snooping and diagnostic tools, which tend to be too expensive for small-network users, but are generally useful for TAN users.

Two of the tools are testing and diagnosis programs that help you determine what's where, what might be causing problems, and how healthy your hardware and systems are.

Snooper (Maxa, 116 Maryland Avenue, Suite 100, Glendale, CA 91206; 818-543-1300, 818-543-0104 [fax]; without board, $229; with board, $299) is a diagnostic application that covers just about everything you'd ever want to know about what's happening on your TAN. The optional board is meant only for systems with NuBus slots. It tracks and displays traffic levels on a variety of subsystems.

The best things about Snooper are that it's meant for average nontechnical users and that it works as advertised. The two manuals are excellent.

System 7's personal file sharing is what really makes small networks practical. There's no need for a server or other special software to get you up and running.

The other testing tool is a new version of the well-known MacEKG II (Micro-Mat, 7075 Redwood Blvd., Novato, CA 94945; 415-898-6227, 415-897-3901 [fax]; $150). MacEKG II, a control panel, is more technically oriented than Snooper. It includes some nice torture-testing routines that can help isolate intermittent faults. Both tools are worthwhile investments for keeping your systems at peak health and efficiency.

PersonToPerson (Asanté Technologies, 404 Tasman Drive, Sunnyvale, CA 94089; 800-662-9686 or 408-752-8388, 408-734-4864 [fax]; $149; twin ten-pack, $399) is a reasonably priced package for people who want simple messaging on small nets. For example, it lets you attach files to messages and also includes an in/out board and other useful network features. It's the standard on our TAN.

The last neat and inexpensive network product I want to mention is easyPrint (SF/O, 2239 Franklin Street, Bellevue, NE 68005; 402-291-0113, 402-291-1211 [fax]; $29.95; ten-pack, $99.95). This tool is most useful if you have a choice of output devices on your net. You can select any of them nearly instantly and create desktop items for drag-and-drop printing to a particular device. You can do the same thing if you have QuicKeys, but it'll take more work to set up.

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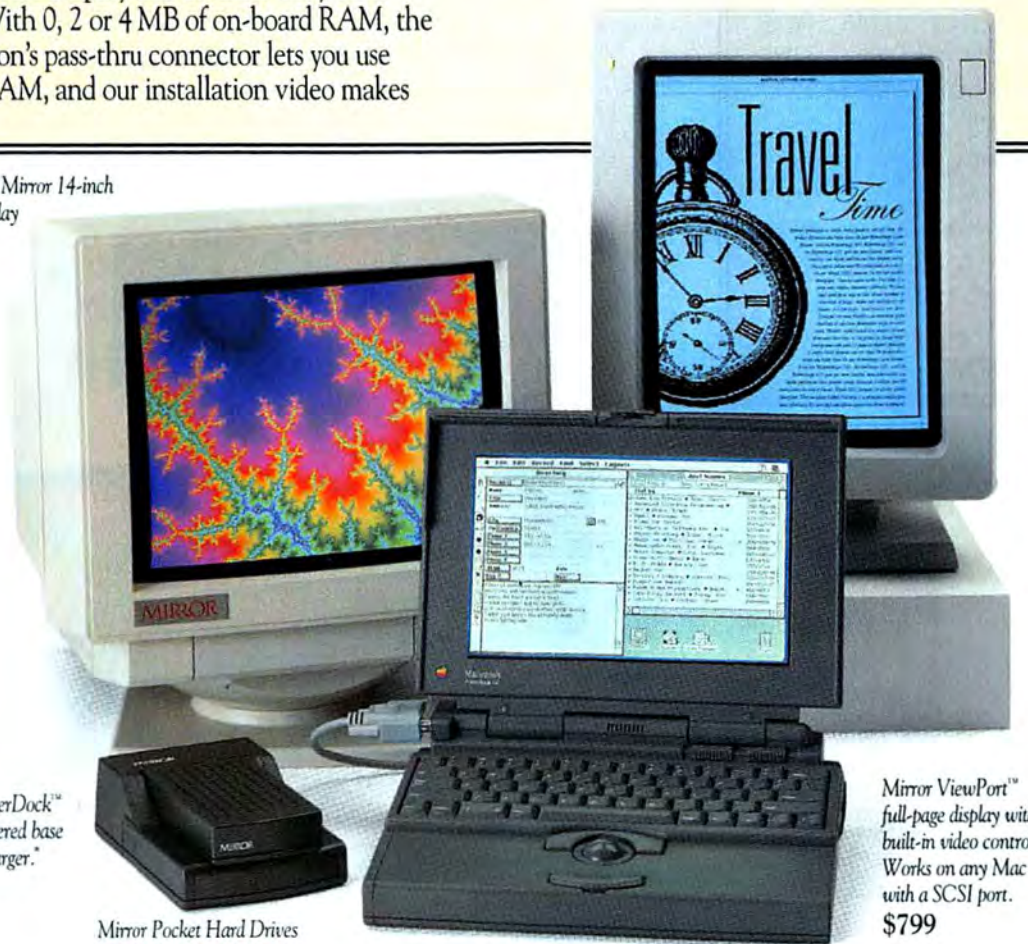

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Road Tip

Suppose you need to print a file from your PowerBook but you can't plug it in to whatever network the nearest printer is connected to. Or you don't have the right printer driver. Bill Monk of ZiffNet/Mac has developed a way to print PowerBook files on any printer, so you'll never be stymied again. Here are the details:

To use this technique, you can't have any printer connected to the PowerBook but you must have PrintMonitor installed and turned on. (To turn on PrintMonitor, select any printer icon in the Chooser box and then click on the Background Printing On button.) You must also have at least one printer showing in the Chooser when you open it, and you must select one of the printers there.

Now just print as you normally would on your PowerBook. Printing will fail. Don't worry about it. That's what you want to happen. Next, open your System Folder and look for the PrintMonitor Documents folder. Open it, and drag the spool file out of it to the desktop. By this time, PrintMonitor's complaining and the spool file's icon probably has an X through it, because there's no printer connected. Cancel the print job — PrintMonitor won't delete the file, because it's now on the desktop, not in the spool folder.

Now it's time for a little surgery: Open the spool file with ResEdit. If you're printing to a StyleWriter, you'll see an alis resource. Delete it: It points to the StyleWriter file on the PowerBook and prevents printing on any other machine.

The file type will have changed to xjob when the print job failed. Change it back to pjob, and save. Copy the file to the PrintMonitor Documents folder of the Mac you want to print from. Be sure Background Printing is turned on in the Chooser, and sit back while it prints.

Pick of the Month

July's Personal Best skipped lightly over programming books because the number of you interested in programming on the Mac is relatively small and the maxim that you can't learn programming from a book is basically true. Here are exceptions to both of the foregoing adages. Dave Mark's *Learn C on the Macintosh* (Menlo Park, California: Addison-Wesley, 1992, 0-201-56785-7; $34.95) not only teaches you about Mac programming but also manages to teach you C at the same time. Every other Mac programming book I've seen assumes at least a fair amount of programming skill and then launches immediately into Mac specifics. Not this one.

This book is worth its price on the strength of the text alone. But there's more. The book is packaged with a version of Think C called Thin C. It's sufficient to get you started, but you'll soon hunger for more. Anticipating that need, the publisher has provided a coupon that gets you the full latest version of Think C for $129, a cost well below even the

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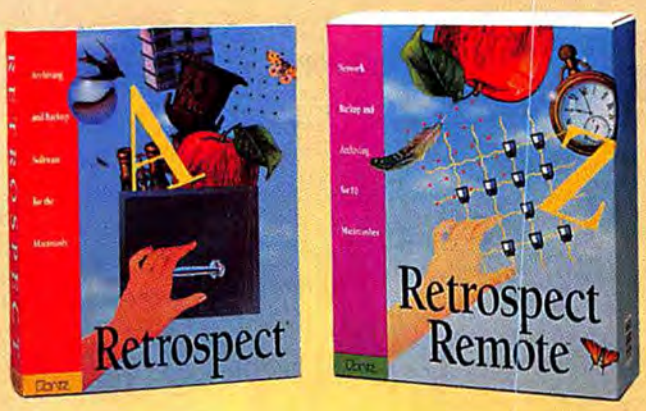

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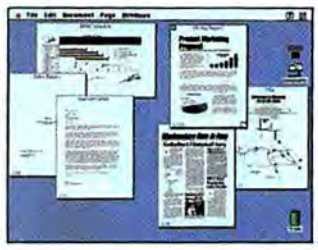

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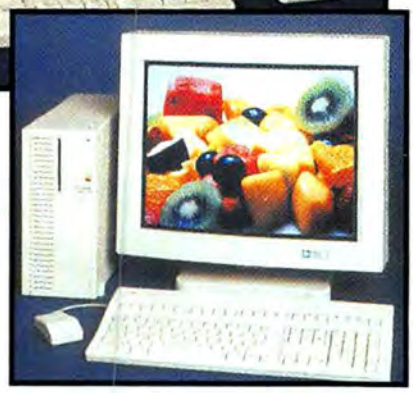

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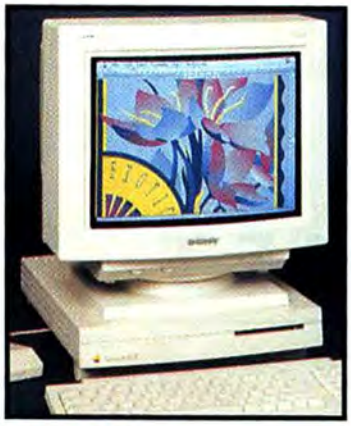

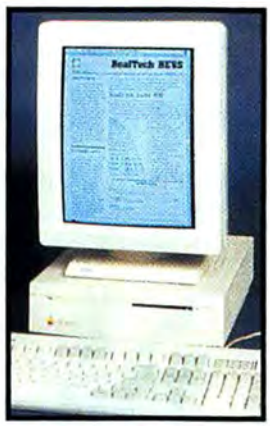

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Suppose you need to print a file from your PowerBook but you can't plug it in to whatever network the nearest printer is connected to. It's time for a little surgery.

Easter Egg 5

Finally, thanks to Terrance Rhea, of Tempe, Arizona, we can see a Word 5 Easter egg. Start by selecting Preferences from the Tools menu. Scroll down to the end of the list of options. Note what's there. For most of you, that'll be the hyphenation controls. If you installed any drop-in modules such as MasterWord 5 or EndNote Plus, they'll be at the bottom.

Close the Preferences dialog box, and hold down the Shift and Command keys as you reselect Preferences. Scroll down the list again. Notice anything different? Maybe something new?

You should see a new icon below Hyphenation and above any drop-ins. It should say Credits. Click on it. Sit back, and watch the show. It's better in color than in black-and-white. It's also fairly long, and you can click on it at any time to exit.

Rumor has it there's another, even better egg in Word 5. So far it's eluded all of us. If you find it, let me know.

Steven Bobker, a former editor-in-chief of *MacUser*, currently keeps busy acting as system operator (sysop) for *MacUser*'s on-line service, ZiffNet/Mac, among other projects. He can be reached at 72511,45 there and welcomes all comments.

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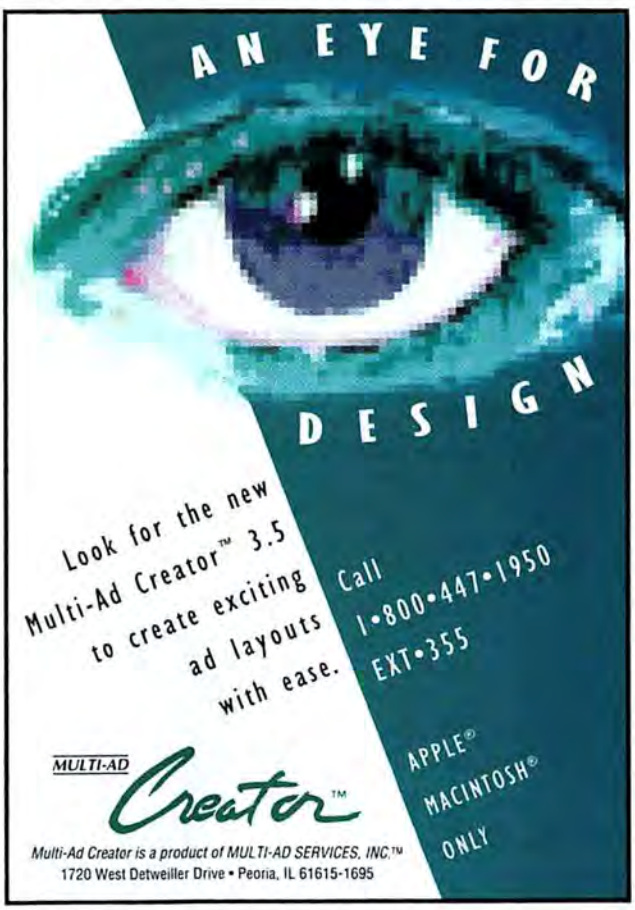

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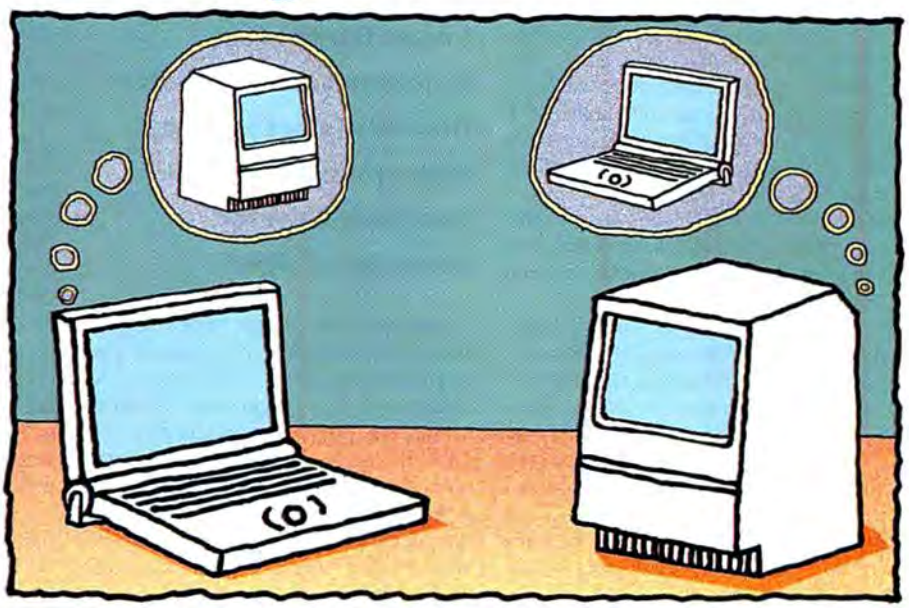
Synchronicity

Reconciling files between your portable and deskbound computers can be a chore. These three utilities hold the promise that you'll never be out of sync again.

By Henry Bortman



I'm not usually intimidated by computers. But my PowerBook 170 has me scared. It's not that I don't like it. On the contrary: I've grown quite attached to it. That's my problem.

There are three files from which I run my daily business life: my to-do list and phone log (In Control), my schedule (Now Up-to-Date), and my address book (FocalPoint — and I don't want any flak about it, either). I didn't have any problem working with these files before. They lived on the IIfx in my office. I didn't take copies of them home with me. I rarely dialed in to the office network from home, and when I did, I treated these three critical files as read-only; I didn't modify them.

All that changed when I got a PowerBook. Now I can work at home or in a hotel room as easily as I can at the IIfx in my office. Now I have *two* copies of my trinity of files, one set on my IIfx at work, the other on my 170. And they're different. I lack synchronicity.

For a while, I tried to remember to copy the files back and forth between my PowerBook and my IIfx whenever I left or returned to the office. But there were times when I'd leave the PowerBook at home — with a modified copy of the trinity files on it — and proceed to the office, where I would then modify the office copies of the same files. Or I'd be in a rush leaving the office, forget to copy the office-modified files to my PowerBook, and then work at home for a day or two, modifying the PowerBook files. Disaster.

I didn't even have to leave the office to have the problem. The IIfx lives on my office desk. The PowerBook hangs out on a small conference table, also in my office. I have a network connection and a telephone in both locations. For a while, depending on where I was sitting when I listened to my incoming voice-mail messages, I might modify either copy of my phone-log file, or my schedule, or my address book. And I might go back and forth between desk and conference table several times during the course of a day. Unless I copied the trinity files each time I modified them on either computer — tedious at best — I was chronically out of sync.

So I've been intimidated. I find myself using the PowerBook more and more and letting the IIfx in my office sit idle. Not because I don't *want* to use it — but because I'm afraid of losing track of critical information. I'm not happy about this. I want to be able to work the way I work and let the computers figure out how to reconcile the conflicts.

Getting in Sync

Recently, beta versions of three new file-synchronization utilities, which attempt to solve problems like mine, crossed my desk: Magnet ($129.95), from No Hands Software (415-321-7340); PowerMerge ($129), from Leader Technologies (714-757-1787); and Update! ($49), from Qdea (612-779-0955). All three of these products should be shipping

by the time you read this article.

PowerMerge and Update! are similar. With each program, you select a folder on one disk volume to synchronize with a folder on another computer. The contents of folder 1, including files and subordinate folders and their contents, are synchronized with the contents of folder 2, which typically resides on another disk volume. Each program copies any file that exists only in one location to the other location. When different versions of the same file exist in the two locations, each program will replace an older-dated version with the version that has the more recent date.

Each program enables you to override this standard file-copying behavior. PowerMerge offers greater flexibility for specifying which files should be copied and which should not, but Update!'s interface is easier to learn. Update! has one curious shortcoming, however: It assumes that you will use a floppy disk as an intermediary for moving files between computers. It doesn't know about System 7 file sharing. PowerMerge, on the other hand, can auto-mount a remote file-shared volume, making it easier to do direct machine-to-machine synchronization.

I want file-content synchronization. I realize that this is not an easy task and that the user-interface-disaster potential is high.

Both programs suffer from a similar narrowness of vision: They require you to put into a single folder all the files and folders you want synchronized. In other words, their limitations dictate how you should organize your data. Computer software shouldn't do that.

Magnet isn't limited in quite the same way. It allows you to create multiple file-manipulation macros, called magnets, each one customized to perform a specific file-manipulation task. That task can be moving, copying, or creating aliases for selected files (and folders). A magnet can be set to run at one specific time or at a regular interval. So you can treat one set of files one way and another set a different way. You still need to put each group of related files into a common folder, along with the magnet that controls them. But the ability to have multiple magnets lets you manage this process at a finer level of detail than that offered by either PowerMerge or Update! And Magnet doesn't assume that a newer file is necessarily better. A magnet informs you of conflicts when it encounters files with the same name in two different locations, but it can't be sure that they haven't both been modified since the last time the magnet ran: It doesn't automatically overwrite one file with another based on their modification dates.

These utilities represent a step in the right direction. But I'm still not satisfied. Because all three of these programs are

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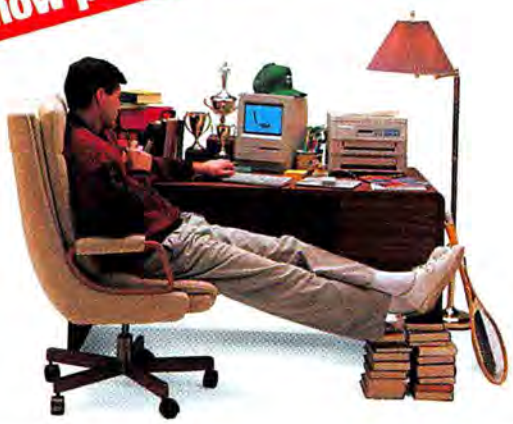

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limited to *file* synchronization. I don't want file synchronization. I want file-*content* synchronization. I want to be able to edit two different copies of my to-do list, residing on two different computers, and then click on a button and have the *contents* of the two files merged into one. I realize this is not an easy task. I realize that the user-interface-disaster potential is high. But it's still what I want.

The problem will only get worse. Soon we'll need to reconcile data not only on different Macs but between Macs and Newtons as well. The same type of information I'm talking about personally needing to manage and harmonize between two Macs — schedules, to-do lists, address books — is precisely the type of information Apple is talking about tailoring Newton computers to handle. But I doubt that the advent of Newtons will make my data-reconciliation problem disappear.

Unfortunately, utilities such as PowerMerge, Update!, and Magnet won't be able to solve the content-reconciliation problem by themselves. It's going to have to be solved by the developers of the applications that create the files whose contents are being synchronized. They'll have to put hooks into their programs that make content synchronization possible. System 7's Apple events open up some tremendous opportunities here if software developers take advantage of them. And I hope they will. After all, isn't that what computers are for — to make managing information easier?

Dockers

While rumors are flying about dockable PowerBooks' coming soon from Cupertino, those of us living in the present can find an excellent solution to the PowerBook-cable plug-in problem in BookEndz, from Pilot Technologies, of Eden Prairie, Minnesota (612-828-6002). BookEndz is a docking station for the PowerBook 140 and 170. I must admit that when I first saw this $179 package, which out of the box looks more like a model-airplane kit than a computer accessory, I was more than a little skeptical about it.

But I figured, What the heck. I spent the 15 minutes or so required to stuff all the plastic inserts and cables into their proper locations and — presto — I can now dock my PowerBook. You don't realize how nice docking is until you don't have to keep plugging in and unplugging all those cables . . . kind of like how good it feels when you stop banging your head against the wall.

The only problem I had was that the internal-modem insert provided by Pilot didn't work with my new internal Global Village PowerPort/Silver modem. So I called Pilot Technologies; complained; and a week later received in the mail a hand-tooled prototype of the new insert that will, by the time you read this, be included as part of the standard BookEndz package. (Try getting service like that out of Cupertino!)

If you too are a cable-weary PowerBook user, check out this product.

Henry Bortman is *MacUser*'s technical director.

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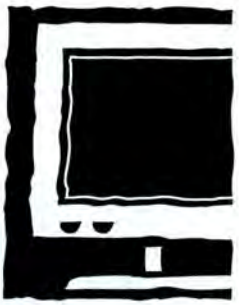

How to Buy

Low-Cost Color Monitors

A color monitor isn't right for everyone: A monochrome (black-and-white) or gray-scale monitor is less expensive and sharper and is a good choice for those who do little more than word processing. But if you're using your Mac for graphic design or presentations, color makes sense. If price has been the only thing keeping you from buying a color monitor, check out the new crop of autosynchronous monitors — their quality has so improved that they're now a real option for fussy Mac users as well as for owners of PCs and clones.

For more on buying monitors, see "Perfection for Pennies: Autosynchronous Monitors," August '92, page 158; "Big Screens for Small Macs: Mac LC and IIsi Color Display Systems," February '92, page 156; and "How to Buy Monitors," November '91, page 217.

By Victoria von Biel

✔ Autosynchronous monitors automatically adjust their scan rate to that of different computers. Formerly, only fixed-frequency monitors, which operate at a single scan rate, could produce high-quality images on the Mac.

✔ Because autosynchronous monitors are popular in the high-volume PC world, they cost less than Mac-only display systems, which consist of a monitor and a video card. A low-priced autosync monitor costs around $550 — compare that with the $1,000 you'll spend for Apple's 13-inch color monitor. Check quality carefully, however.

✔ Most autosync monitors are manufactured for the PC world, so many have a permanently attached VGA-style cable on the back. If you buy one of these, make sure you get a Mac-to-VGA adapter.

✔ Tell the dealer which Mac (or Mac video card) you'll be hooking the monitor up to, and make sure you get the appropriate cable — all Macs with built-in video and many new Mac video cards check for specific connections on the video port. If you don't have the right cable, the video circuitry won't work.

✔ Mac support for autosync monitors is not universal: Find out before you buy how hard it is to get the cables you need. Mac cables are included free with some monitors and have to be purchased separately for others. Always be sure to specify the appropriate cable, and ask whether it comes standard or as an option (and if so, for how much).

✔ You can plug an autosync monitor straight in to any Mac with built-in video (the Mac IIci, IIsi, LC, and Quadras).

✔ If your Mac supports a color monitor but doesn't have built-in video (the IIfx, IIcx, II, and SE/30), you'll need to buy a video card from a vendor such as RasterOps or SuperMac. Just make sure that the monitor you're interested in is compatible with your video card. You should call the monitor or card vendor for confirmation.

✔ In addition to being low-priced, autosync monitors are useful because they can work with a variety of computers. But if you plan to plug your monitor in to several different computers, make sure that the monitor's control buttons are easily accessible, either at the front or on the side but *not* on the back.

✔ Look for monitors with the following controls: brightness, contrast, horizontal position, vertical position, horizontal size (or width), and vertical size (or height).

✔ Some monitors have etched screens to cut down on glare, but glare reduction shouldn't come at the expense of sharp focus. You can also reduce glare with antiglare screens from manufacturers such as NoRad, Kensington, and Curtis.

✔ When you buy a monitor, ask to see several brands at once so you can compare their performance. To avoid interference from magnetic fields, which can cause screen jittering, don't place the monitors too close together.

✔ A good monitor has accurate screen geometry — circles are round, not oval, and squares have straight, even sides. There may be distortion or fuzziness at the edges of the screen because the electron beam that creates the screen image has to travel farthest to get to the edges, but the distortion should be minor. You can easily test a monitor's screen geometry with Larry Pina's Test Pattern Generator shareware program (available from user groups and on-line services such as ZiffNet/Mac).

✔ Test for sharp focus by displaying a document with small fonts and thin lines — a spreadsheet, for example.

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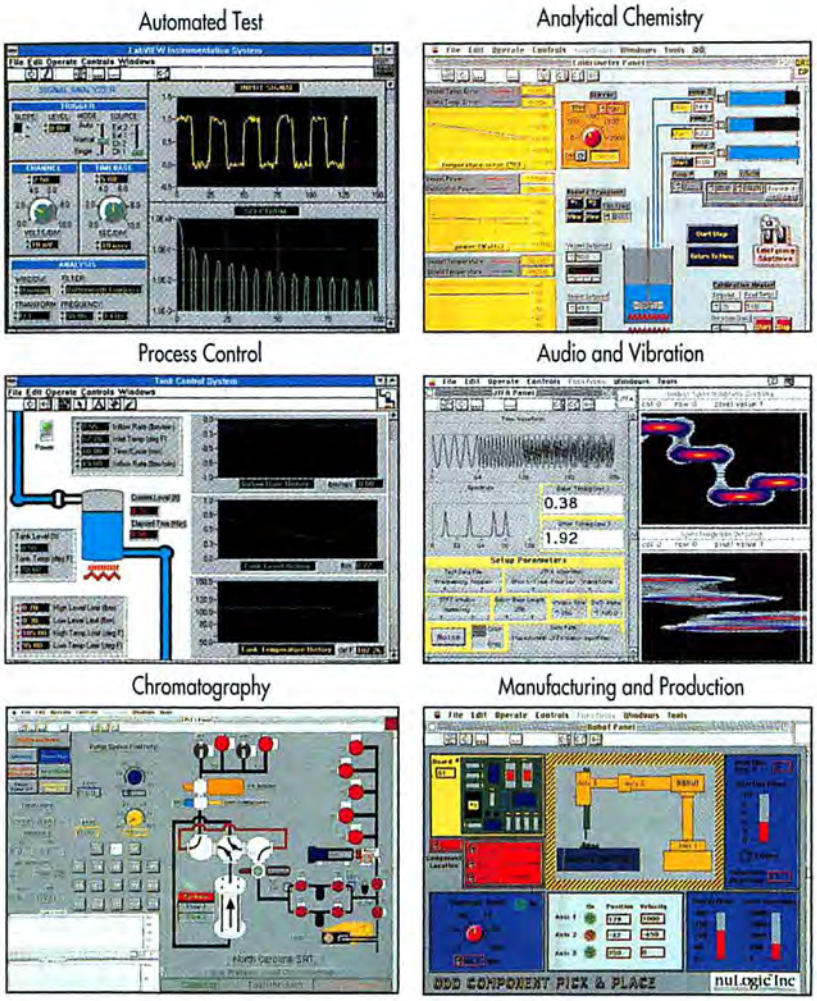

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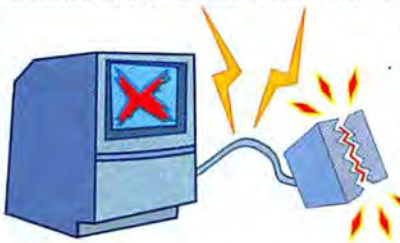
Admit it: You don't know what V.42bis means, let alone how to pronounce it. You need *The Macintosh Dictionary*, by Andy Baird (Reading, Massachusetts: Addison-Wesley, 1992), which translates 700 of the most common Mac words and phrases into plain English with illustrations. And you'll be relieved to know that unlike the Microsoft Word 5 manual (which weighs more than a PowerBook 170), *The Macintosh Dictionary* is small enough to fit into your pocket, ready for any Mac-related linguistic emergency. 617-944-3700. $10.95.

By Victoria von Biel

Memory is made of this: If System 7 takes up a little more RAM than you'd bargained for, here's a solution. Memory Maxer, one of the five programs included in Innovative Utilities from Casady & Greene ($79.95), takes you **back to the good old days** by letting you quit from the Finder, which frees up 300K or so of memory that your applications can then use. More prosaically, Memory Maxer also lets you specify how much memory an application gets. (A bonus: Innovative Utilities also includes Conflict Catcher, an extension manager that walks you through the process of identifying and fixing extension or control-panel conflicts). 408-484-9228. ✘ If you need **lots and lots more memory** for your IIci, IIfx, or Quadra, get out your credit card, get on the phone, and get some 16-megabyte SIMMs. At press time, prices had dipped below $580 per SIMM and they're still falling. But remember, you have to buy them in sets of four, so you'll need lots and lots of money.

Terminator 3: Can "active" terminators prevent SCSI-related system crashes and data loss? Drive manufacturer Mass Microsystems thinks so and is now shipping **new, blue terminators** with most of its products. Unlike traditional passive terminators, the blues can regulate voltage fluctuations. Who'll benefit most? Anyone who uses a Quadra or IIfx, machines whose higher-speed SCSI signals can cause problems, or anyone using SCSI devices that are "noisy" (scanners are frequent culprits) or have poorly shielded cables. The terminators aren't commercially available, but if you're a registered owner of a Mass Microsystems product (and you're in SCSI hell), call tech support, and they'll fix you up. 800-442-7979 or 408-522-1200.



Power printing: If all you've got is a Classic and an ImageWriter, you can pretend your hardware's a little more sophisticated by using WonderPrint, from Delta Tao Software, a utility that lets QuickDraw printers create halftonelike printouts of color and gray-scale images rather than clunky black-and-white output. 408-730-9336. $59. ✘ EasyPrint, from SFO, makes printing easier by letting you bypass the Chooser and select a networked printer from the desktop. Quick, easy, and — at $29.95 — a bargain. 402-291-0113. ✘ A little more elaborate is Printer Picker (part of Atticus' Super 7 Utilities, $99.97), a control panel that adds a printer menu to the menu bar so you can select as many as five networked printers. Super 7 Utilities has another cool feature: It comes with a postpaid return envelope into which you stuff all the recyclable packing materials to ship back to Atticus. 203-324-1142.

The Ultimate PowerBook

By Richard Wolfson

If you find you're using your PowerBook as much in the office as on the road, you can make it into a perfectly usable desktop Mac in several ways — if weight isn't a problem, that is. The PowerBook's popularity has not gone unnoticed by the manufacturers of hard drives, monitors, and other peripherals and accessories usually reserved for desktop Macs. So if you want to beef up your PowerBook (and your bank account is up to it), you have plenty of options, some of which are shown here. For a fuller listing of products for the PowerBook, get the latest edition of Apple's *PowerBook Guide*, available from the on-line services AppleLink and America Online.

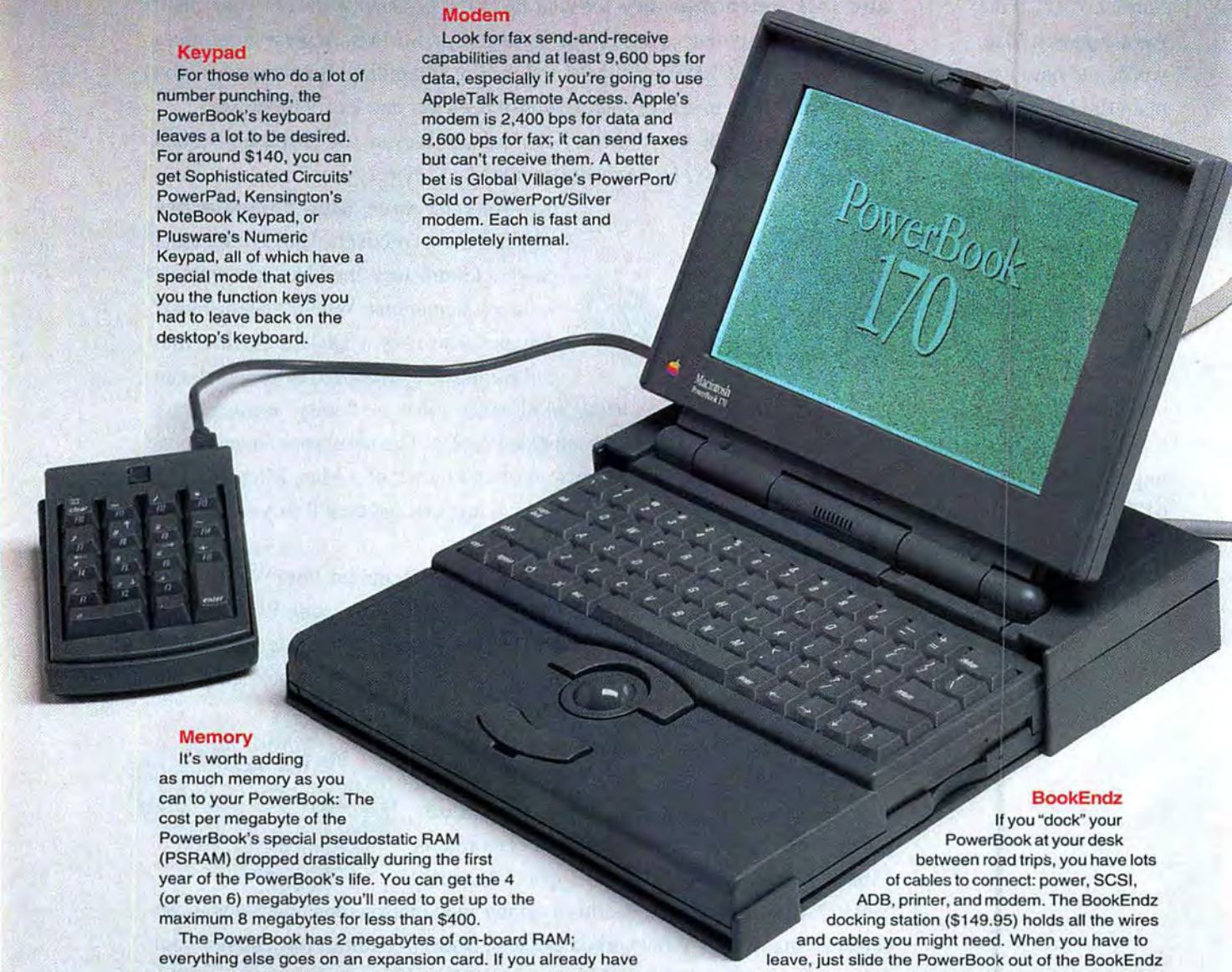
Richard Wolfson, a professor of technology at Montclair State College, in New Jersey, is the author of the newly released *PowerBook Companion*.

Keypad

For those who do a lot of number punching, the PowerBook's keyboard leaves a lot to be desired. For around $140, you can get Sophisticated Circuits' PowerPad, Kensington's NoteBook Keypad, or Plusware's Numeric Keypad, all of which have a special mode that gives you the function keys you had to leave back on the desktop's keyboard.

Modem

Look for fax send-and-receive capabilities and at least 9,600 bps for data, especially if you're going to use AppleTalk Remote Access. Apple's modem is 2,400 bps for data and 9,600 bps for fax; it can send faxes but can't receive them. A better bet is Global Village's PowerPort/Gold or PowerPort/Silver modem. Each is fast and completely internal.



Memory

It's worth adding as much memory as you can to your PowerBook: The cost per megabyte of the PowerBook's special pseudostatic RAM (PSRAM) dropped drastically during the first year of the PowerBook's life. You can get the 4 (or even 6) megabytes you'll need to get up to the maximum 8 megabytes for less than $400.

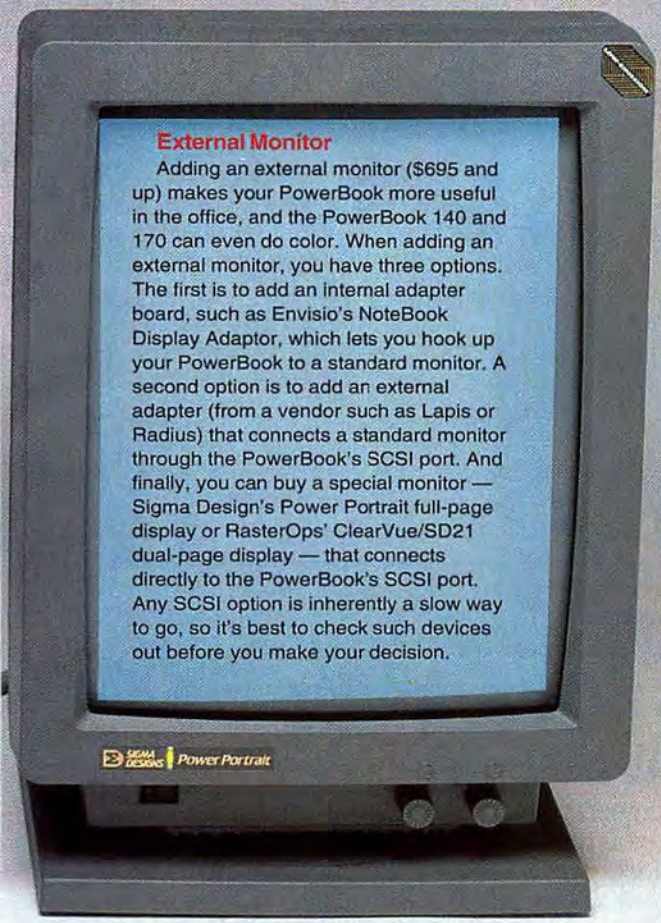
The PowerBook has 2 megabytes of on-board RAM; everything else goes on an expansion card. If you already have 4 megabytes, look for a company that will let you trade in your extra megabytes when you buy a 6-megabyte expansion card. Another thing to look for: TSOP (thin small-outline package) chips, which allow for a thinner card and therefore more airflow.

BookEndz

If you "dock" your PowerBook at your desk between road trips, you have lots of cables to connect: power, SCSI, ADB, printer, and modem. The BookEndz docking station ($149.95) holds all the wires and cables you might need. When you have to leave, just slide the PowerBook out of the BookEndz casing, and you're on your way; when you return, slide it back in. You not only save time but you also save wear and tear on the PowerBook's connectors, which are more delicate than the ones on its desktop counterpart.

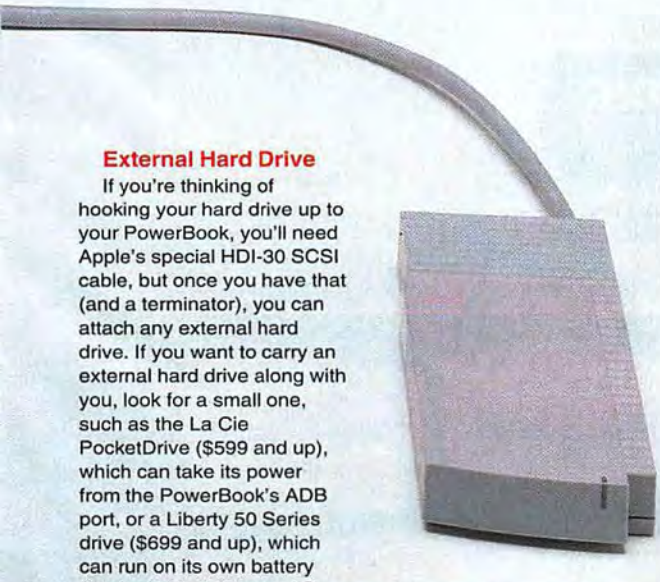
External Monitor

Adding an external monitor ($695 and up) makes your PowerBook more useful in the office, and the PowerBook 140 and 170 can even do color. When adding an external monitor, you have three options. The first is to add an internal adapter board, such as Envisio's NoteBook Display Adaptor, which lets you hook up your PowerBook to a standard monitor. A second option is to add an external adapter (from a vendor such as Lapis or Radius) that connects a standard monitor through the PowerBook's SCSI port. And finally, you can buy a special monitor — Sigma Design's Power Portrait full-page display or RasterOps' ClearVue/SD21 dual-page display — that connects directly to the PowerBook's SCSI port. Any SCSI option is inherently a slow way to go, so it's best to check such devices out before you make your decision.



Internal Hard Drive

Is the 20- or 40-megabyte drive that came with your PowerBook choking? You can squeeze a replacement internal drive into the PowerBook. Try a MacLite drive, from CMS Enhancements ($699 and up), or a RoadRunner drive, from Microtech International ($549 and up). Microtech also makes a special casing for the hard drive you'll be taking out of your PowerBook so you can use it as an external backup drive.



External Hard Drive

If you're thinking of hooking your hard drive up to your PowerBook, you'll need Apple's special HDI-30 SCSI cable, but once you have that (and a terminator), you can attach any external hard drive. If you want to carry an external hard drive along with you, look for a small one, such as the La Cie PocketDrive ($599 and up), which can take its power from the PowerBook's ADB port, or a Liberty 50 Series drive ($699 and up), which can run on its own battery (each also has its own AC power adapter).

Mouse

Several small mice and trackballs — Appoint's Thumbelina Mac and MicroSpeed's MicroTRAC, for example — work particularly well with the PowerBook, and because they're easy to hold and operate with one hand, they're useful for presentations. Around $75.

Scanner

Why type? A hand-held scanner can be useful for entering data (from business cards, articles, letters) into your word-processing or spreadsheet documents. Caere's Typist Plus Graphics has its own power supply and can read both text and graphics. $695.

External Battery

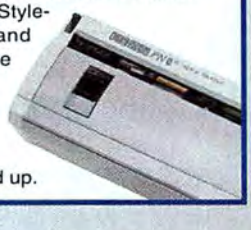
Even the best battery-management techniques seldom get more than three hours of power from a charge. If you're ready to carry around five pounds more, you can get a day's worth of power from an external battery pack such as Lind Electronic Designs' Auxiliary Power Pack. $189.

Battery Recharger

Having a separate battery recharger makes sense, especially if you have more than one battery. Apple's recharger brings the battery up to 80-percent charge in two hours and then, in Trickle mode, up to full charge in another six hours. For PowerBook 100 users, the External Battery Charger, from Lind ($149), is a fast charger that provides a full charge in two hours. For those who have a 140 or a 170, Lind's Full Cycle Battery Charger ($189) first fully discharges the battery (a recommended procedure for NiCad batteries) and then recharges it completely.

Printers

A PowerBook outputs to any printer a Mac can use (you may need an adapter), so consider the lightweights: the Canon BJ-10ex, the GCC Technologies WriteMove, the Kodak Diconix M150 Plus, and the egg-carton-sized Citizen PN48. Apple's StyleWriter, larger and heavier than the portables, can be quite a good choice if battery power isn't essential. $400 and up.



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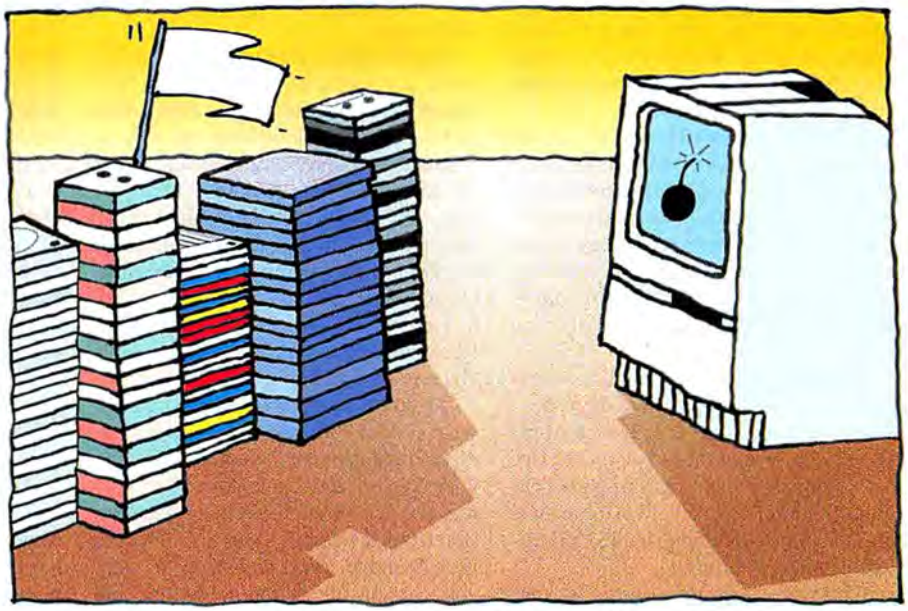
CIRCLE 131 ON READER SERVICE CARD.

Quick Recovery

When your Mac turns violent — bombing, crashing, and performing other terrorist acts — you need to act quickly to save your data. Here are ten tactics for dealing with wayward Macs.

By Bob LeVitus



Someday when you can least afford it, you'll turn on your Mac and see a flashing question mark. Or your Mac will tell you that your hard disk is "not a Macintosh disk" and ask if you want to initialize it. Or it will crash every time you start up.

Don't worry. Most problems are easy to fix if you have the right tools and you know the proper techniques. You don't even have to go out and buy anything — all the tools you need are on the system-software disks that come with your Mac or your System 7 upgrade.

Now don't get me wrong: I'm not putting down disk- and data-protection programs such as Symantec's Norton Utilities for Macintosh 2.0 (see review, September '92, page 58), Central Point Software's MacTools 2.0, or Fifth Generation Systems' Public Utilities. They can work wonders. But before you resort to them, try any or all of the techniques I'm about to describe. None of them requires any software you don't already have, and none of them is destructive, so they won't cost anything except some time, and you won't have to worry about making things worse.

1. Back up your data. If you haven't backed up your data in a while — to another hard disk, tape, or floppy disks — stop reading this column, and do it. This is the most important thing I'm going to tell you. Go on; I'll wait.

Although the tips I offer can fix many problems and programs such as Norton Utilities and MacTools can too, a good backup is the only thing you can absolutely depend on.

2. Restart. If your Mac starts acting up, don't panic. Turn it off for a minute or two (use the Shut Down command if possible, but if not, go ahead and switch your Mac off), and then restart. You'd be surprised at how often this causes strange behavior to disappear.

If that doesn't do the trick, stay calm. Don't do anything foolish like clicking on OK when your Mac asks if you want to initialize your hard disk. There are plenty of other techniques to try, and if they fail, you backed up your hard disk just a minute ago, right?

3. Use Disk First Aid. Apple provides a powerhouse of a disk-repair tool in its Disk First Aid program, which you'll find on the Disk Tools disk that came with your system software. Disk Tools contains a System Folder (so you can boot from it) and a copy of Disk First Aid, which can repair many kinds of disk damage and is one of the most valuable tools in your arsenal. If you haven't already done so, make a copy of it right now and keep it within arm's reach of your Mac at all times.

When your hard drive begins acting wonky, start up your Macintosh with the Disk Tools disk in the floppy drive. Launch Disk First Aid, and click on the Drive button until you see your hard drive's name appear. (If things are really screwed up, you might see "Disk With Bad Name" instead of your hard drive's name.) Click on the Open button, choose Repair Automatically from the Options menu, and click on the Start button.

After a few moments, you'll see a message

like "Repair Successful," "No Repair Needed," or "Unable to Repair Disk." If it fails to make the repair, run it again. Sometimes Disk First Aid starts to fix something and then quits — succeeding passes keep fixing more and more until things get better. When you've finished with Disk First Aid, quit and try to restart your Mac from its hard disk.

4. Install a new driver. Drivers tell your hard drive how to interact with your Mac. They're placed on the hard disk by the formatting software that comes with your drive. If they become damaged from a crash or power interruption, your hard drive may crash continually on startup or the disk may refuse to mount (its icon doesn't appear in the Finder).

To rectify the problem, install new drivers. If you have an Apple hard drive, boot from your Disk Tools disk, launch Apple HD SC Setup, and then click on the Update button. If you have a third-party hard drive, follow the instructions in the manual for updating (sometimes called *installing*) a hard-disk driver.

Whatever you do, *do not initialize* your hard disk. Be very careful here: You use the same program to install a new driver that you use to initialize your hard disk, but if you accidentally initialize your disk, you'll be in deep yogurt. It is almost impossible to restore the contents of a hard disk that's been reinitialized.

5. Rebuild the desktop. System 7 stores a pair of invisible files on every disk it mounts. These files tend to become damaged or corrupted, at which point they cause all sorts of problems, such as system crashes, disks that won't mount, or "Application can't be found" messages. To fix a damaged desktop file, restart your Mac while holding down the Command and Option keys — this is called rebuilding the desktop. For every disk that mounts, you get a dialog box that asks, "Are you sure you want the desktop rebuilt on the disk Your-Hard-Disk-Name-Here? This may take a few minutes." Click on OK.

Rebuilding your desktop has one negative side effect: Any comments you've typed into the Get Info window disappear after you've rebuilt the desktop. Unless you really depend on those comments for organizational reasons, losing them should be no big deal. If you really must hang on to them, you can use one of several utilities, such as Norton Utilities, that let you rebuild your desktop without losing the Get Info comments.

6. Replace the System file. The System and Finder are two files that, like the invisible desktop files, often become damaged. When they do, your Mac may crash more than usual, bomb on startup, or just act strange.

If your Mac is exhibiting such symptoms, try replacing your System and Finder files with fresh ones. But before you start, drag any fonts or sounds you've installed in your System file into a folder for temporary safekeeping. Then boot from the system software's Installer 1 disk and go through the procedure for installing the system on your hard disk. Once you've installed a new system, try to restart your Mac from its hard disk. Remember to reinstall any fonts or sounds you removed earlier.

If you still have problems and you think your system software is the culprit, try this more draconian method of replacing your System and Finder files (but note that you will lose any system resources stored by other applications in the System file): Remove sound and font files from your System file as you did before, and then restart your Mac with the Disk Tools disk in the floppy drive. Open the System Folder on your hard disk, drag the System and Finder files into the Trash, and empty the Trash. Then use the Installer to reinstall the system.

7. Zap your PRAM. The Mac has a small amount of special RAM known as PRAM (parameter RAM). It keeps your Mac's clock running and stores settings such as the brightness, highlight color, cursor blink rate, and keyboard repeat rate, even when your Mac is turned off. PRAM sometimes gets scrambled and needs to be reset, or zapped. To do so, restart your Mac while pressing Command-Option-P-R. You must press the key combination before the Welcome to Macintosh dialog box appears and continue to hold all four keys down until the desktop appears. Unlike rebuilding the desktop, zapping PRAM provides you with no confirmation of its success.

8. Check for conflicts. Repeated bombing and crashing is commonly caused by extensions and control panels that conflict with your system and other software. To disable all your extensions and control panels, restart your Mac while holding down the Shift key until "Extensions Off" appears in the Welcome to Macintosh dialog box. If you can restart successfully, one of your extensions or control panels is probably causing problems.

Here's the slow but thorough way to find the culprit: Create a folder, and name it something like Removed Stuff. Move all the items in your Control Panels and Extensions folders (they're inside your System Folder) into the Removed Stuff folder, and then reboot. With pen and paper at your side to note the order in which you restore your files, drag the items one at a time from the Removed Stuff folder into your System Folder (System 7 puts them into either the Extensions or the Control Panels folder). Restart your Mac after you add each one. At some point, the problem will return — your hard drive will crash at startup or soon thereafter. Check your notes to find the last item you moved from the Removed Stuff folder into the System Folder, and you've found your culprit. As long as you don't move it back into your System Folder, you'll be fine. Call its publisher to find out if there's a workaround.

9. Check SCSI termination. The little devices that help prevent noise and strange behavior on the SCSI bus are called terminators. They look like the plug on the end of a SCSI cable without any cable attached. If you have more than one SCSI device (internal hard drives count as one device and are almost always terminated), you need a terminator at each end of the SCSI chain. Most external SCSI devices have two cable connectors for daisy-chaining (linking several SCSI devices sequentially), so you need to plug the terminator in to the last unoccupied cable connector in the chain. Some external SCSI devices contain internal termination and don't require a plug-in terminator. Check your SCSI device's manual for details. (For more on SCSI, see "Surviving SCSI," August '92, page 228.)

10. Check SCSI IDs. The Mac lets you connect as many as six SCSI devices, each of which must be assigned a number from 1 to 6. Most devices have DIP switches, push buttons, or thumb wheels for selecting the ID number. A conflict occurs if two devices have the same ID number, so make sure all of your SCSI devices are assigned a unique number from 1 to 6.

There you have it — ten things to try when disaster strikes. If none of these works, give Norton Utilities or MacTools a try; if that doesn't do it, you can always restore crucial files from your backup. You do have a backup, don't you?

Bob LeVitus is the author of *Dr. Macintosh*.

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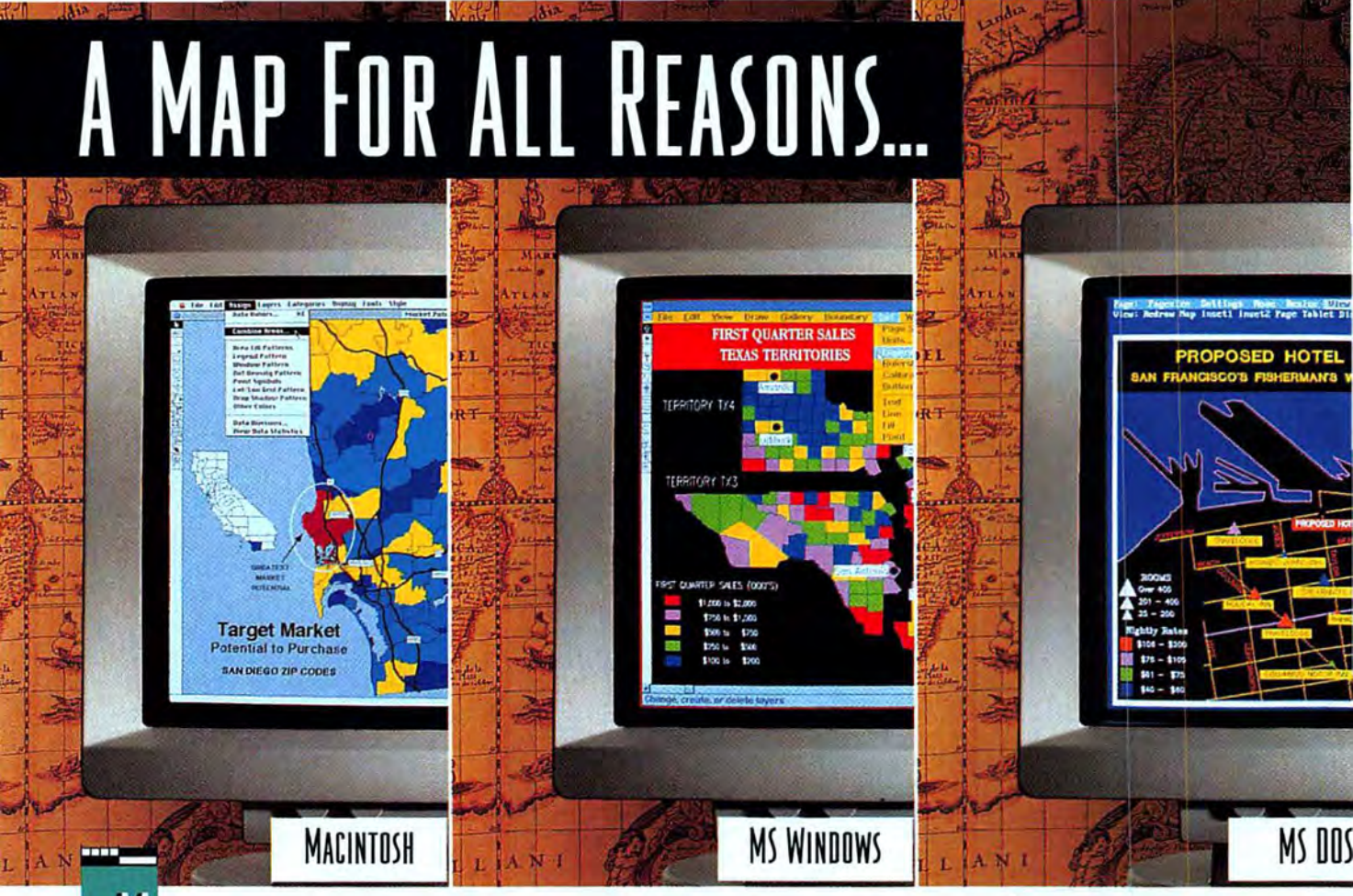

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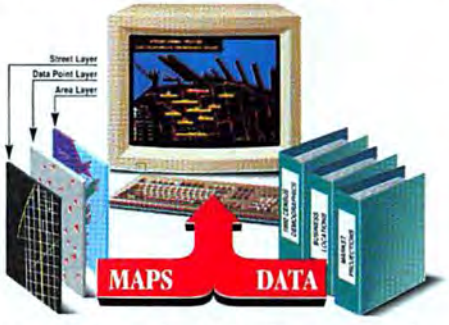

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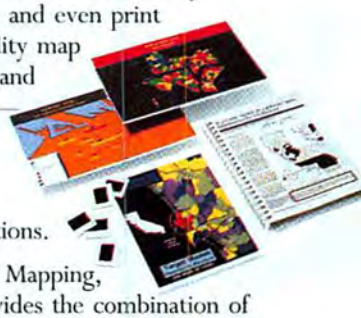

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CIRCLE 187 ON READER SERVICE CARD.

Repairs and Upgrades for the

Mac IIfx

Once upon a time, the Mac IIfx was the cock of the walk. It was fast and powerful, and it signaled, folks said, Apple's commitment to "workstation computing." Times change, however, and Apple doesn't make the IIfx any more, having dropped it in favor of the 68040-based Quadras.

But wait just a minute: With six NuBus slots (even the Quadra 950 has only five), a sturdy power supply, and a rugged case, the IIfx is still a force to be reckoned with. Here's how to pump up your IIfx's volume *and* bring it up to 68040 speed.

By Don Crabb

Start by beefing up your Mac's **memory (RAM).** Your stock IIfx probably came with as little as 4 megabytes of RAM, but why not beef that up to a more workstationlike 32 megabytes? Do this by installing 4-megabyte SIMMs (use the 9-bit-parity jobs so you can take advantage of the IIfx's parity-checking feature). You'll now be able to comfortably use memory-intensive applications such as those for image rendering, CAD, page layout, and high-end-database development. Expect to pay $125 and up per SIMM, but it'll be money well spent, believe me.

If your machine lives on a network, add an **Ethernet card** and dispense once and for all with slow LocalTalk speeds. You'll spend about $250 for that upgrade from such vendors as Asanté, Farallon, and Shiva.

Replace your old **mouse** with a variant from Kensington, MicroSpeed, Logitech, or others (don't forget Apple). You'll pay at least $50 for a new mouse or trackball.

What better way to give your IIfx Quadra-like performance than to install a **68040 accelerator?** For around $2,000, you can get a 33-megahertz board (the same speed as the stock 68040 in the Quadra 950) from such companies as Radius, Fusion Data Systems, and MacMemory. Getting a 68040 upgrade, although expensive, makes sense as long as a Quadra 950's street price is around $7,000. A fast 68040 board makes an already speedy IIfx all the more useful for high-end graphics and QuickTime applications, although there is still some software that can't run on a 68040. (If you'll be using your IIfx for QuickTime and graphics work, you'll probably want to add a QuickTime frame-grabber board and a QuickDraw graphics accelerator too.)

Finally, add a **big color monitor.** Yes, they're expensive, and many people don't need one. But if you do graphics, DTP, or QuickTime work or use any application that benefits from a multicolor large display (complex spreadsheets or charts, for example), then a large-format monitor makes sense. To drive the thing, you'll need a **24-bit accelerated-video card** such as the Radius PrecisionColor 24, the RasterOps 24XLi, or the SuperMac Thunder/24. It's not an inexpensive option: The monitor and card (loaded with RAM) will set you back $5,000 or more.

Table 1: Recommended Upgrades for the Mac IIfx

Upgrade	Pros	Cons	Approximate Cost
32 MB of RAM	• Speed. • Can use several applications at once.	• None.	$1,100
Ethernet card	• EtherTalk speed.	• Useful only on Ethernet networks.	$250
SCSI-2 accelerator	• Faster disk transfers.	• Needs a fast hard drive to be of use.	$350 and up
External hard drive	• Portable storage space.	• None.	$450 and up
Large-format monitor	• Easy on the eyes.	• Expensive.	$700 and up
68040 accelerator	• Speed, speed, speed.	• Expensive.	$1,600 and up
System software	• Full System 7.	• None.	$99
New input device	• A new mouse or trackball can make an old Mac feel new.	• None.	$50 and up
Total price			$4,600 and up
Street price of a new Mac Quadra 950 8/400			$7,000

Table 1: Add every upgrade I suggest, and you'll have a machine that can hold its own against any Quadra — *and* it comes in a little cheaper than if you had chucked the IIfx and bought a new 950 right from the start.

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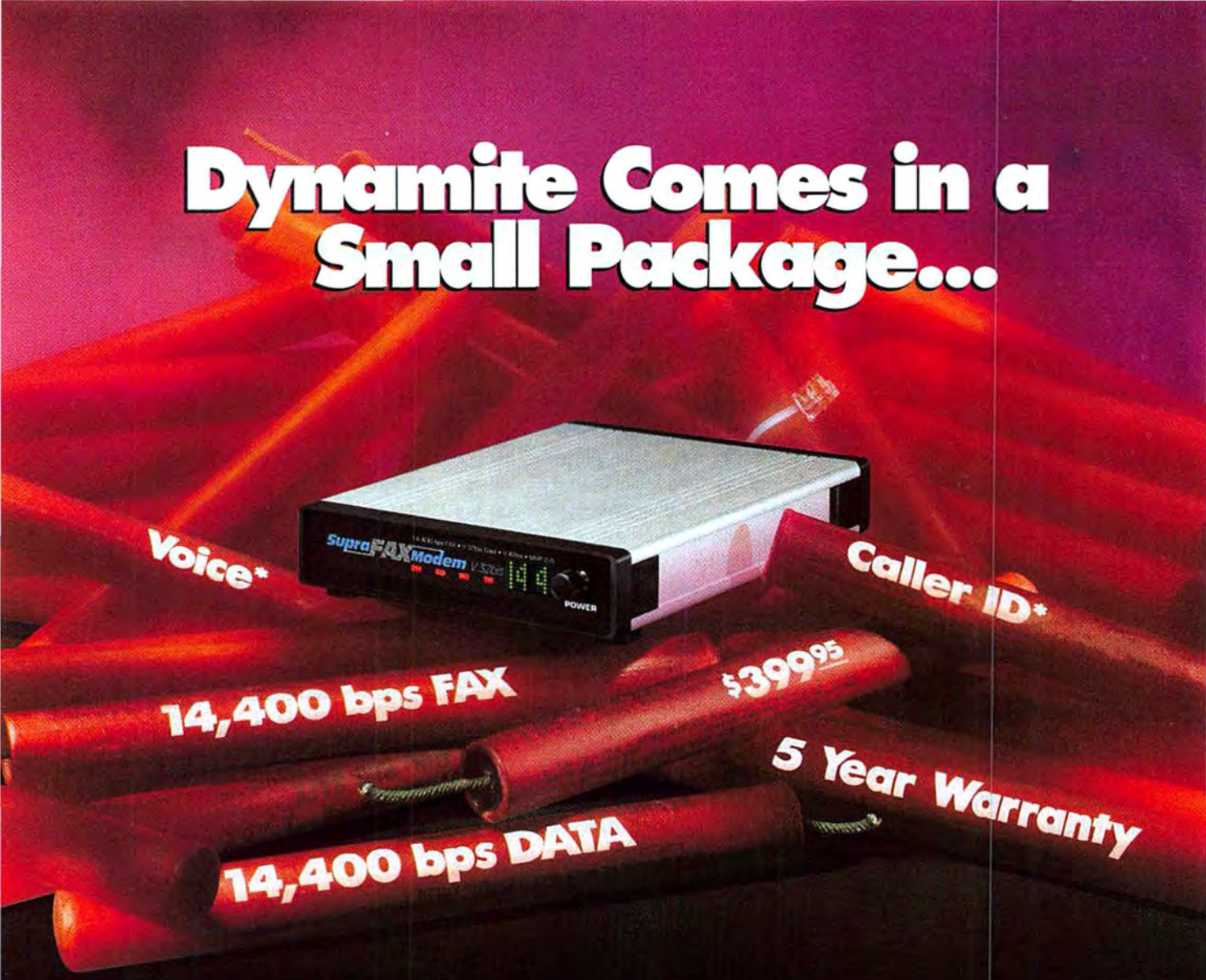

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TIP SHEET

Nobody ever said you had to live in Cupertino to be a Macintosh expert. Know-it-alls are everywhere, from Manhattan to Malibu — even in Waldport, Oregon, where we found our own Mac guru, Philip Russell. Each month Phil shares his own tips plus the best from the 70-odd Macintosh-user-group (MUG) magazines he reads each month. But Phil can't do it alone. To those whose undocumented Mac tip *MacUser* prints, we pay $25, and the Reader Tip of the Month earns $100.

Send your tip, together with your name, address, and phone number, to Tip Sheet, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. You can also contribute tips electronically via ZiffNet/Mac, the on-line service for *MacUser*. Send

them to Gregory Wasson at 72511,36. Be sure to include your full name and mailing address along with the text of the tip.

By Philip Russell

Reader tips compiled by Gregory Wasson

■ Recycled paper for your laser printer may do more than help the environment: Because the fibers have already been used at least once, recycled paper is more flexible while going through your printer. Toner is less likely to flake off it too. And recycled paper reacts better to changes in temperature and humidity.

■ The usual advice for resolving a control-panel conflict is to restart while holding the Shift key down to deactivate all extensions and then to replace the extensions one at a time, restarting after each addition. But here is a faster way: Deactivate your extensions, reinstall half of them, and restart. If no problems result, you know that these extensions are OK. Reinstall half the remaining extensions; if they work, keep reinstalling half of those left until you find the culprit.

■ Virus detectors often raise hell with installers. The best bet for avoiding problems is to turn off virus-detection utilities and restart *before* you use installer software.

■ Can't rename a volume under System 7? Turn off file sharing, rename the volume, and then turn file sharing back on.

■ A tip from Mark Hickenbottom of the Monterey, California, ClubMac: A straightened paper clip isn't the best disk-ejection tool. It's too apt to bend or go places that it shouldn't. A much better investment is a $4 1/16-inch pin punch from Sears, item 9HT42881. It's solid, won't bend, and is just the right size. If you *must* use a paper clip, get a big, thick one, and be careful.

■ Start all graphics you draw in Word 5.0's graphics module in the upper left corner of the screen to avoid unwanted white space in your graphic. Word includes any white space you leave at the left or top when the graphic is imported.

■ To speed up printing, save your document, select Print, and immediately close the application. Don't reopen the application until printing is finished.

■ When a PICT image imported into a desktop-publishing program is cropped too close, you may lose part of the image. Before you copy the image, place a narrow borderless rectangle with no fill on the offending side (usually the top). The imported image will think it has to include the rectangle, giving your real image plenty of breathing room. Then you can use the cropping tool to adjust the margin you've created.

■ A tip from MacinTalk, the Nashville, Tennessee, MUG: If you fly a lot with your Mac Plus, SE, or Classic, get a subscription to the quarterly *Airline Seating Guide* (Carlson Publishing Co., Box 888, Los Alamitos, CA 90720; $29.95 per year). It tells you how much room there is under each seat, so you can be sure to get a seat that accommodates your Mac.

■ Everyone knows that you should save frequently, but here are some especially important times: Just before a large cut, copy, or paste; just before opening a new document or an additional window; just before opening a DA; and just before printing. When in doubt, use the Save As command — that way you will have protected the original.

■ A tip from Ken Peterson, of the Portland, Oregon, MUG: If you're mailing disks and want to avoid the postal service's mangling machines, pack the disks with bubble-pack shipping bags and a little foam sheet material. Place the wrapped disk in a 4-x-6- or 5-x-7-inch catalog envelope. Just make sure the whole thing is more than a quarter-inch thick: The mail guys have to hand-stamp anything thicker than a quarter inch. If you avoid extra cardboard, Jet-Pak bags, and so on, you'll get away with two 29-cent stamps most of the time.

■ If your Mac freezes while you're working on a document, try saving with Command-S before you reboot. Sometimes a frozen Mac honors this keystroke, so you don't lose all your work.

■ Here's an unusual use for a header: Open a header; make it very shallow; and paste in rulers, graphics, bits of text, and font samples. If you leave the header on-screen, you can copy and paste frequently used items from this holding area into your main document.

■ If the bullet you place at the start of each item in a list is too small and you pump it up

Reader Tip of the Month: PowerBooks

Although Apple warns you not to connect a PowerBook 140 or 170 directly to a desktop Mac, you can create a mininetwork with two Farallon PhoneNET connectors and a short piece of standard four-wire modular telephone cord. Plug one connector in to the printer port of the desktop Mac and the other in to your PowerBook, and then turn on file sharing. This arrangement permits data transfers at 250,400 bps — a cut above the speed of a 2,400-bps modem but well below Ethernet speeds. You don't need any extra cards or software, and it costs less than $100.

Anthony F. Mournian
San Diego, CA

to a larger size, the line spacing goes crazy. To avoid this, select the entire list. Specify a leading size that approximates automatic leading for the large bullet's type size (about 120 percent of text size). Then when you enlarge the bullets, the line spacing won't change.

■ If you're using System 6 and want to make sure everything is saved to disk and not into memory only, turn off the RAM cache (in the General Controls control panel) before you save.

■ What do you do if your document is just one or two lines too long for a single page? Try this: Find a blank line, highlight it, decrease its size by several points, and your copy will jump upward slightly. If you have enough blank lines to work with, this method can make your text fit on a single page.

■ If you like to use the Scrapbook a lot, try opening it and moving it to the lower right corner of your screen. Then open the application you're working with. Grab the resize box, and pull the application window up and to the right just enough to show some of the Scrapbook. All you need to see is a sliver. Then you can click back and forth between the Scrapbook and document easily.

■ TeachText in System 7 can open many orphaned text and graphic documents. If you've left an alias of TeachText on your desktop, the next time an application "can't be found," just drop the offending document onto the TeachText alias. If the alias highlights, let go, and the file will open.

■ Want to redraw the PageMaker screen real fast? Go to the screen saver's sleep corner, let the screen saver flash on, and then haul the mouse back out of the corner.

■ To copy ruler settings between paragraphs in MacWrite II, place the cursor in the paragraph to be changed. Then scroll to the paragraph whose attributes you want to copy. Hold down the Option and Shift keys while you click in that paragraph, and the new paragraph will have those settings.

Reader Tips

System 7 Finder

In the Finder, selecting file or folder icons in a window and then choosing Copy from the Edit menu places the names of the selected files and folders into the Clipboard as text separated by carriage returns. You can then paste those file and folder names into a word-processing or spreadsheet file.

Chris Cogar
Richmond, VA

Microsoft Word 5.0

Here are some ways to tweak Word 5.0's Find function: First choose the Commands command from the Tools menu and remove the Command-F shortcut from the Find command; then substitute it for Replace's Command-H shortcut. Replace does searches just as well as the Find command and gives you the option of replacing whatever you're searching for with something else.

Second, although Microsoft has finally added a Search Up function, it usually takes much longer than the default Search Down. Unless you need to search up through less than 10 percent of a long document, you should use the default Search Down command. You don't need to bother to reset the pull-down menu to Search All either, because it's much faster to press the Return key when Search Down asks you if you want to start again at the beginning of the document.

Michael Scriven
Inverness, CA

StyleWriter

If you're using a StyleWriter and System 6.0.7, you can improve the printer's speed by replacing the StyleWriter driver with the one that comes with the latest version of System 7 Tune-Up. (System 7 Tune-Up is widely available from on-line services, user groups, and Apple dealers.)

With the old StyleWriter driver, the printer stops two or three times per page to think about the next part of the text it's printing; the new driver eliminates these annoying stops.

Cor Glorie
Diemen
The Netherlands

Monitors Control Panel

Whenever I take my trusty Mac on the road but leave behind my second monitor, the Mac still thinks the second monitor is attached, because I haven't removed its video card. This means that when I double-click on a folder, it's likely to appear where it was last opened — that is, back home on my second monitor.

To circumvent this, I open the Monitors control panel and move the icon of the second screen so that it will be visible on the monitor I'm using. After I reboot, the folder reappears on the screen. This also works for some applications that memorize window position.

André Ouimet
Ottawa, ON
Canada

DTP

If you want to get true foot and inch marks when referring to measurements in feet or inches, use the Symbol font instead of straight quotes for better results. Click in the space where you want the mark to appear, switch over to the Symbol font, and press the Option-4 combination to get a foot mark or Option-comma for an inch mark.

Dan Kaufman
Washington, DC

Norton Utilities' FileSaver

Under System 7, emptying the Trash can take a while if you have several items in it and have Norton Utilities' FileSaver installed. Here's how to speed things up: Simply keep an alias of the FileSaver control panel on your desktop. When the Trash is full of files you're sure you don't ever want to restore (sample files, tutorials, or temporary files, for example), double-click on the alias, temporarily turn off FileSaver, and then select Empty Trash. After the Trash has emptied, you can turn FileSaver back on.

David Jarsky
Los Angeles, CA

Desktop

If you want to use the Finder's commands simultaneously on files from different volumes such as hard disks or partitions, all you have to do is move the files to the desktop first. Because all of the volumes' desktops are treated as one desktop by the Finder for most operations, all the files that were transferred to the desktop can now be selected together and worked on simultaneously. In addition, the files do not need to be copied when they are moved to the desktop, unlike files that are moved from one volume to another, which require copying and duplicating. This method lets you work a lot more quickly.

I use this trick to open more than one file simultaneously within a single program: I just drag all the selected items onto an alias of the application on the desktop.

Gregory Charles Rivers
Hong Kong

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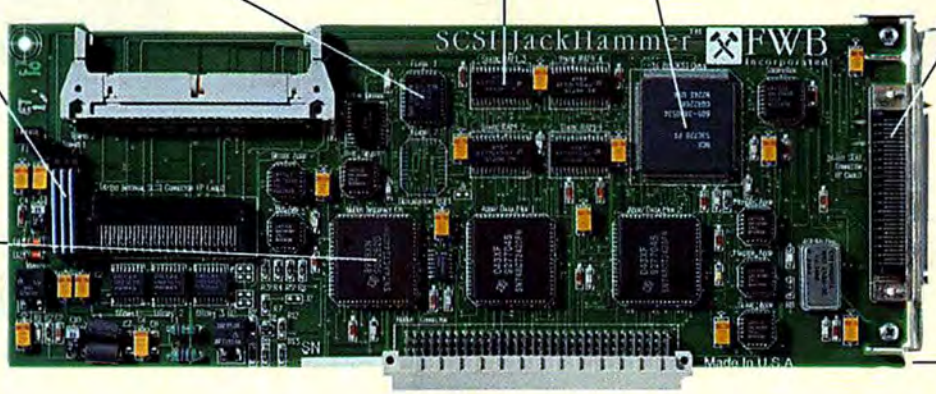

68-pin, 16-bit wide SCSI-2 connector includes a 68/50-pin adapter cable for connecting any SCSI drive

Powerful TI™ chipset enables bus master control and DMA block mode transfers

State-of-the-art six-layer circuit board with surface mount components, all made in the USA

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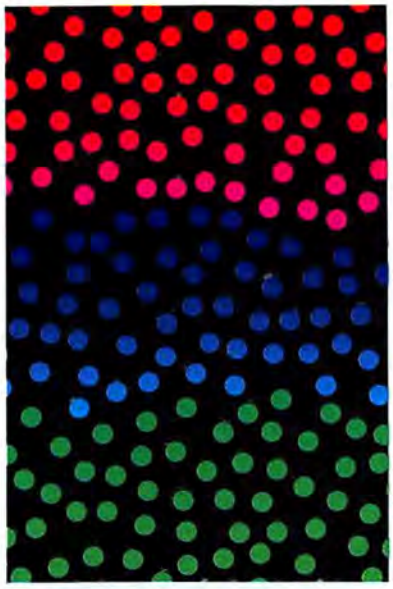

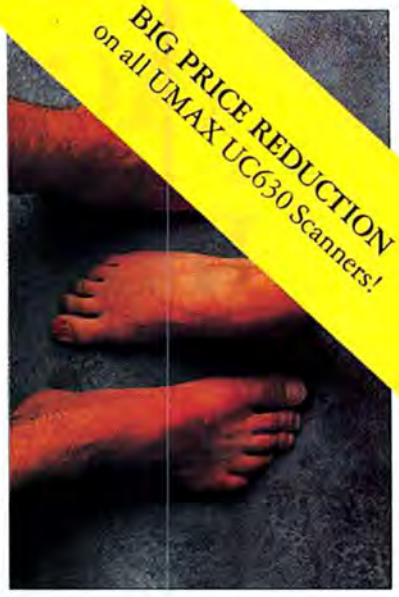

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CIRCLE 145 ON READER SERVICE CARD.

HELP FOLDER

Questions anyone? Here's where to get answers from the experts. Bob LeVitus is the author of the best-selling *Dr. Macintosh*, second edition. Andy Ihnatko is a longtime activist with BCS•Mac. They're both ready to answer your questions about everything Macintosh.

Write to Help Folder, c/o *MacUser*, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Don't want to wait for an answer? Post your question on ZiffNet/Mac, *MacUser*'s on-line service, and get a reply from Bob (76004,2076), Andy (72511,204), or one of the other *MacUser* experts. See the masthead in this issue for instructions on how to sign up.

By Bob LeVitus and Andy Ihnatko

Is Batch Printing Possible?

Q. Is there an easy way to print batches of documents (say, 15 MacDraw Pro files) without having to open each one individually in the application and then use the Print command?

John Schumacher
Freiburg, Germany

Bob: Yes, batch printing is possible, and it's easy. Just select all the icons of documents you want to print, and then use the Print command on the Finder's File menu. The appropriate application will launch, and the Print dialog box will appear. It shows up only once, even if you have selected several documents. If you hold down the Shift key and click on the document icons one at a time, you can control the order in which they print: first clicked, first printed.

This technique works only for documents created by the same application — you can batch-print all your MacDraw Pro files, but if you want to batch-print some MacWrite files too, you'll have to go through these steps twice — once for the MacDraw files and again for the MacWrite files.

Monstrous Menu Bars

Q. After I launch FileMaker Pro on my SE/30, the program's application icon appears in the far-right corner of the menu bar. Unfortunately, the icon seems to be pretty *far* right — it doesn't respond to a mouse click, thus disabling the use of the application menu.

When I called to complain, Claris' tech support blithely told me, "It works fine under System 7" and suggested that I remove MacroMaker from my system to save menu-bar space! This rather inconvenient alternative avoids these questions: *Why* doesn't it work properly under System 6, and how can I *make* it work properly?

Gary Makowski
Newport Hills, WA

Andy: It would appear that Claris designed FileMaker Pro's menu bar for use with 640-x-480-pixel screens, callously ignoring those of us who are stuck with the crummy 512-x-342-pixel screens that come with compact Macs and Apple's 12-inch color monitor. When the menu bar just isn't wide enough, doodads at the end of the menu bar or even entire menus are forced out, making lots of features semiworthless. And Claris is incorrect in saying that things work fine under System 7: FileMaker Pro squeezes out the Balloon Help menu (see Figure 1). Although FileMaker Pro doesn't support Balloon Help, it's hardly normal behavior.

Unfortunately, too many programs do this. It's quite against standard user-interface guidelines — software is supposed to work the same on all Macs, and conventional wisdom has it that if a menu bar won't fit on a 512-x-342-pixel screen, it's just too complicated. The only way of dealing with it is finding some way of conserving menu-bar real estate. Figure 1 illustrates a bunch of methods, all of

* . . . But Were Afraid to Ask

Pope Pius X once wrote, "To say of someone 'He preaches simply' is to say 'He walks with God.'" Well, modesty forbids me from discussing whom I've been walking with lately, but it's as good an excuse as any to remind everyone that here at Help Folder, we reserve valuable space every month for those questions that may be considered simple, silly, or even downright peculiar.

To protect those living in cities where peculiar behavior is subject to zoning restrictions, we'll change all names to those of a randomly selected versatile Baroque master unusually gifted at adapting musical composition to the peculiar inflections of spoken English.

Q: Is it possible to use a color monitor with the likes of an SE or a Classic?

Henry Purcell
1659–1695

Andy: If by *color* you mean anything other than black or white, then sure. All Macs starting with the SE support the eight classic QuickDraw colors: black, white, red, green, blue, cyan, magenta, and yellow. If you've ever wondered why so many older color programs supported only these eight semi-improbable hues, well, now you know. These colors weren't really designed for screen graphics; they were just tossed into the Toolbox to allow color plotters and printers to interact with Mac software in a studly manner.

Several companies sell a monitor interface that lets you hook up a monitor to your old Mac via the SCSI port, but you'll be stuck with those eight crummy colors and the few measly, outdated programs that use classic QuickDraw color.

But if you mean color as in "more colors than are commonly found in the cheapest box of crayons at the drugstore," then you're out of luck. Nowadays, color programs rely on Color QuickDraw, built in to all the non-68000-based Macs. The Classic II, based on the 68030, has Color QuickDraw built in, which enables it to use a 256-color monitor via a SCSI-monitor adapter.

which can solve problems caused by all but the most savagely large menu bars. Unfortunately, they scrunch the menu bars of all applications instead of just FileMaker Pro's.

If you want the Finder and other applications to remain unaffected, you'll have to use ResEdit to shorten FileMaker Pro's menu names. It's pretty simple: Just open a copy of FileMaker Pro with ResEdit, and double-click on the entry for its MENU resources. You can then edit each menu title to your heart's content.

Always work on a *backup* copy of FileMaker Pro; if you somehow manage to cheese things up or if one day you move up to a larger screen, you'll want to have a pristine copy tucked away somewhere. I know you knew that, but under state law, we're obliged to mention basic ResEdit safety at every turn.

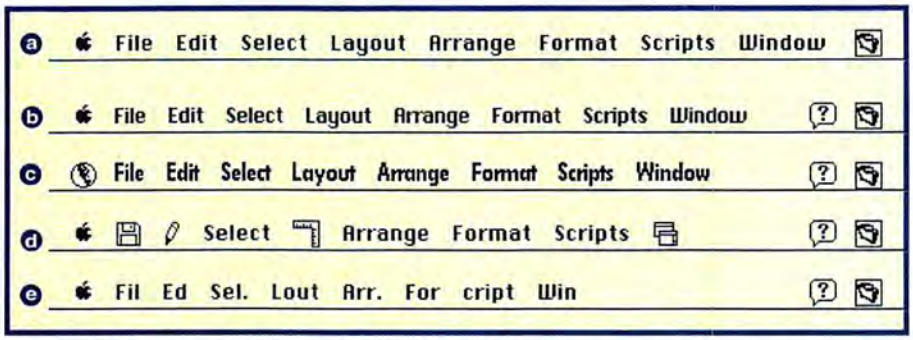

Figure 1: If a program such as FileMaker Pro starts shoving important menu items off the menu bar (a), it's time to get a little pushy yourself. CramBar (b) is a freeware product that scrunches menu-bar text together; SetFont (c) is shareware that lets you specify a narrow font to be used by the system when drawing text in menu bars, windows, and buttons; and MICN (d) is public-domain software that substitutes icons for some popular menu titles. If none of these solutions works for you, use ResEdit (e) to shorten menu names.

PageMaker Helper?

Q. I use PageMaker but don't have a laser printer. My problem is that when I take PageMaker documents elsewhere to be printed, I sometimes forget a font or linked TIFF file. Is there some way I can get PageMaker to tell me which fonts and TIFF files are in a document?

Nancy Cassman
Glenview, IL

Bob: PageMaker can't do it, but there is an extremely useful product that can: CheckList 2.0.2, from ElseWare (3201 Freemont Avenue N., Seattle, WA 98103; 206-547-9623). After scanning your PageMaker document, CheckList displays a detailed report that lists which fonts the document contains, the current print options, and more (see Figure 2). It also lets you know if any of the required files are unavailable and if there are other problems that might affect printing. Best of all, CheckList can create what it calls a bundle: compressed copies of *all* the files needed to print the document (the publication itself and all fonts, kerning tables, APD/PPD files, and linked graphics). The bundle is self-extracting, so you don't need to take a copy of CheckList along to the service bureau.

Version 2.0.2 is commercial software and costs $179.95. A special limited version, 1.0d, which can't save or print reports or create bundles, comes with the latest version of PageMaker; you can upgrade to the commercial version for $79.95. A shareware version, 1.0c, is available from on-line services and user groups for a $45 registration fee. You can upgrade to version 2.0.2 for an additional $134.50.

I've used CheckList for several months and have to say it's well worth its price for anyone who transports PageMaker files elsewhere to be printed.

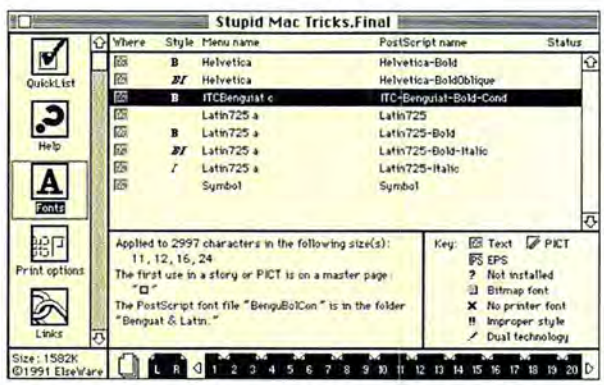

Figure 2: If you keep forgetting to schlepp those vital fonts and graphics to the service bureau, try ElseWare's CheckList 2.0.2. It provides lists of fonts, graphics, and other document elements, and it even lets you bundle everything into one self-extracting file.

Mo' Better Ports

Q. Are there any serial-port boards available for the Mac? Does the Mac's design preclude them, or was the exclusion a marketing decision?

Also, why does Apple require you to use a 25-pin connector to hook up SCSI devices to the Mac rather than the standard 50-pin connector used by all other SCSI devices? And why do suppliers compound this problem by assuming that their device is the one that will be plugged in to the Mac rather than in to another SCSI device? Consumers should either get a choice of cables at the time of purchase or cables shouldn't be included with products so users can just buy the right one.

Arnold Madeira
Cranston, RI

Andy: Originally the limited number of serial ports was a design decision. When Apple developed the Mac, its attitude toward users was much like God's attitude toward Adam and Eve: "We'll give unto them a paradise full of everything they could possibly need, but if they try to grab more, we'll make things as difficult as possible and cause some serious repercussions."

So to begin with, the closed nature of the hardware (the lack of any expansion slots) ensured that even if someone designed a card with extra serial ports, there'd be no place on the motherboard to install it. Even when "open" Macs hit the market and people started selling extra serial ports on NuBus cards, there was still the problem of getting the Mac to acknowledge all those foreign ports.

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The Mac has only three built-in software drivers for dealing with serial ports: one each for the modem and printer ports and an AppleTalk driver for use when the printer port is to be used for networking. Early NuBus serial cards shipped with special software that allowed one of the new ports to substitute for the printer or modem port or came with a special communications program that could access the new ports directly. Now that we have the Communications Toolbox (CTB), using extra serial ports is a piece of cake. Instead of choosing between the modem and printer ports, CTB-studly telecom and printer software scans the hardware for available serial ports and has you pick one from a list.

And now we arrive at the answer to your question: The $499 QuadraLink DMA card, from Applied Engineering, gives you four additional serial ports with standard connectors. If you have the Communications Toolbox (an integral part of System 7 or an INIT for System 6 users), you can use all four ports in addition to the modem and printer ports. If you don't have the CTB or if your software isn't the least bit CTB-studly, you can bamboozle your Mac into thinking that the modem or printer port is actually one of the ports on the QuadraLink, temporarily disabling the real port for the duration but gaining all of the QuadraLink ports in the process.

If you don't have a Mac with NuBus expansion slots and you do have a modem, the only way for you to gain an extra serial port is to replace your standard external serial modem with a Global Village TelePort modem, which plugs in to an ADB port. The TelePort is similar to the QuadraLink ports, in that it can be used either with the CTB or as a fake serial port, but those clever folks at Global Village have gone one step further: If you're using the printer port for AppleTalk, the TelePort can still act like a modem hooked up to the printer port.

About that second question: Sure, it's a bummer to unpack your new hard drive and find out that the vendor has packaged the wrong cable. To prevent irate users from arming themselves and seeking vigilante justice at corporate offices throughout the land, most drive manufacturers will swap a supplied Mac-to-SCSI cable for a SCSI-to-SCSI cable on request. So if you get the wrong cable, don't pick up a chain saw — pick up the phone.

Finding a Local User Group

Q. I have had problems locating Mac user groups. Can you provide a list or direct me to someone who can?

Andrew Malby
Bozeman, MT

Bob: Go straight to your phone, and dial Apple's toll-free hot line: 800-538-9696, extension 500. Tell them your ZIP code, and you'll get contact information for all user groups in your area. If you live outside the U.S., call your local Apple dealer, or if there's a university near you, see if it has a user group.

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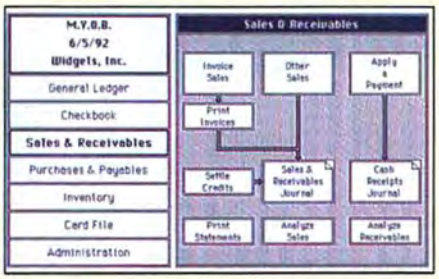
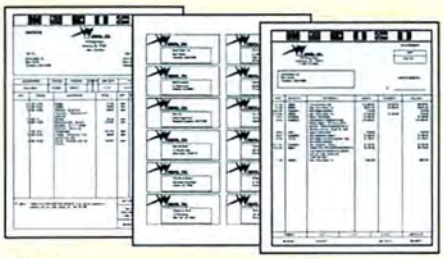


"M.Y.O.B. ...command buttons ...are arranged in a flow chart...you don't need to be an accountant to know the order in which the command should be used." MacWorld



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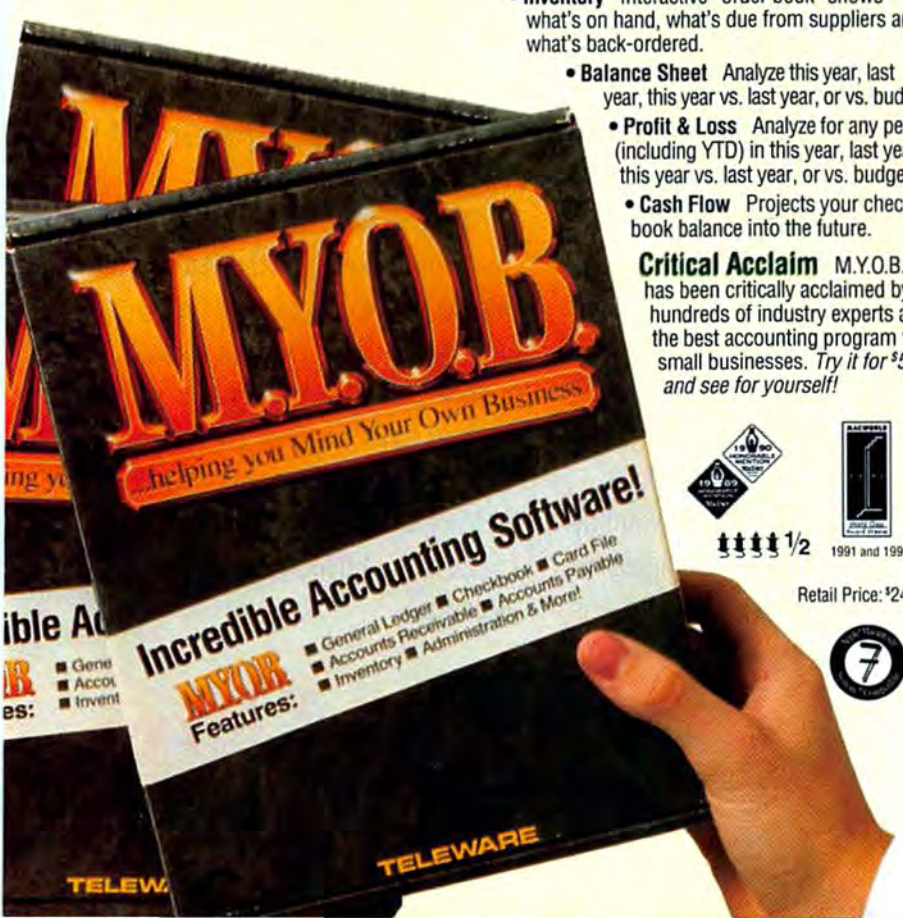

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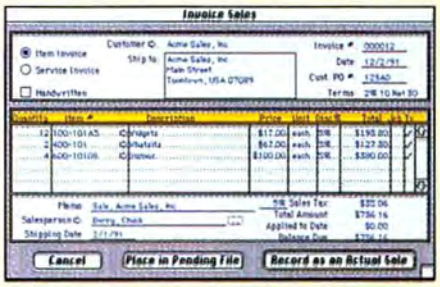
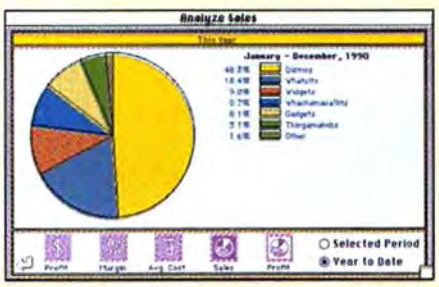


"Only a few programs make good use of the Macintosh interface. Teleware's M.Y.O.B. has one of the best interfaces." MacWorld



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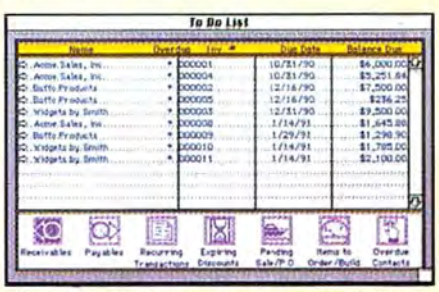

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This Month on ZiffNet/Mac

ZMAC UTILITY

Sharing files within a workgroup is a chore. You have to create a server and make sure everyone keeps it up-to-date or else move files on floppy disks. But as usual, there's a better way: This month's utility, FolderDash, automates file routing to various locations on a network.

FolderDash lets you drag and drop a file onto the FolderDash icon to copy or move the file across the network. FolderDash routes the file according to the type of application that created it or the filename. For instance, you could have all PageMaker files routed to the art department's server while all files whose names started with *Invoice* would go to accounting. You can send any file to multiple locations to develop distribution lists. You can also replace files that have been modified since the last drag-and-drop, so you can use FolderDash for simple backup.

FolderDash was programmed by well-known shareware author and ZiffNet/Mac assistant sysop Rob Gibson. It's available exclusively on ZiffNet/Mac (type GO ZMC:POWERTOOLS) and can be downloaded without connect-time charges until September 25, 1992. After that, find the file FOLDAS.CPT in the Download & Support Forum (GO ZMC:DOWNTECH).

By Ben Templin

On-line Upgrades

If you have a 128K you're using as a doorstop or a IIcx you think is rapidly becoming obsolete, let *MacUser*'s newest contributing editor, Don Crabb, know about it and he'll give you the lowdown on upgrades. Don will hold court in the MacUser Forum (GO ZMC:MACUSER) in Section 9 (Guest of the Month) from September 14 through September 25. And don't forget to read Don's new monthly column, The Mac Workshop, which focuses on how to make more of your Mac through upgrades and repairs.

Free (and Nearly Free) Files

Sysop Gregory Wasson presents a sampling of files recently uploaded to ZiffNet/Mac's Download & Support Forum (GO ZMC:DOWNTECH). The CompuServe filenames appear in parentheses.

Belgian PostCards (BELGPC.SEA) is a TeachText replacement that does all the things TeachText can't — it styles text, supports graphics, and lets you save your document as a TeachText file. Shareware, $25.

Discolour (DISCOL.CPT), formerly known as CFloppy, is a system extension that colorizes the dull black-and-white floppy-disk icons that appear on the desktop on color Macs running System 7. Freeware.

DiskStatus (DISTAT.CPT) provides a display of the free and used space on all of your current disks, including floppies. Use it as a startup application under MultiFinder or System 7 so that it can sit quietly on your desktop, providing information on space allocation when you need it. Freeware.

PowerAlias (PALIAS.CPT) combines as many as five application aliases in one alias. You launch PowerAlias either by double-clicking or by dragging and dropping a document onto its icon. You specify which of the five applications PowerAlias should launch by simultaneously double-clicking on the alias icon and holding down a user-defined key on the keyboard. Shareware, $5.

Private Secretary (PVTSEC.SEA) monitors your phone via a Hayes-compatible autodial modem, notifying you by pager and/or a phone at another location that a call has come in. It also logs the time and number of calls received. Shareware, $34.95.

PwrSwitcher (PWRSWI.CPT) is a system extension that lets you cycle through the active programs by pressing the power key on your keyboard. With the Shift key down, PwrSwitcher cycles through active programs in reverse order. Requires System 7 and a keyboard with a power key. Freeware.

The 102nd U.S. Senate (102SEN.CPT) is a FileMaker Pro database containing the names, party affiliations, phone numbers, and committee assignments of the 102nd United States Senate. This is a dry run of a more sophisticated version planned for release after the November '92 elections. Freeware.

VoiceWaker (VOICEW.CPT) is an After Dark module that lets any microphone-equipped Mac wake up at the sound of your voice. It displays no graphics unless you use it in Caps Lock mode or with MultiModule. VoiceWaker requires that After Dark be installed. Shareware, $5.

Zmac Tip of the Month: 4th Dimension and Navigator

Many users like using the CompuServe application Navigator to log on to ZiffNet/Mac, mainly because it saves them money by going on-line, automatically collecting forum messages, and then logging off so the messages can be read off-line. Unfortunately, the resulting session file can be quite awkward to read and use.

SatNav, a 4th Dimension database program, comes to the rescue. It imports, archives, and manages messages, file listings, and E-mail from CIS-session files created by Navigator 3.x. It automatically creates an address book of user names and IDs from downloaded messages, including E-mail from Internet gateways and other networks.

SatNav requires that you have ACIUS' 4D 2.2.3 or later as well as 2.5 megabytes of RAM. For a $75 shareware fee, you can get the compiled version. Download the 496K file SATNAV.SEA from the Download & Support Forum (GO ZMC:DOWNTECH).

Direct Line

For many of you, mail order is your primary means of purchasing Macintosh products and services. That's why MacUser has put together the following special section.

It's what you've been demanding — a convenient place to quickly find the products you need from the vendors you want to buy from. MacUser's Direct Line to products is just one more reason to turn to MacUser for relevant information aimed at the serious user.

CALL 1-800-666-2562
TIGER ORDER HOTLINE

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GUARANTEED LOWEST PRICES
ON ANY MACINTOSH PRODUCT

FULL-MOTION VIDEO, CRISP DIGITAL SOUND.

VideoSpigot Turns Your Mac Into A Movie Studio!

REVIEWER'S NOTEBOOK: *Capture video from a camcorder, VCR or videodisc player and convert it to QuickTime™ format to play on your Mac. VideoSpigot™ delivers high-quality, 24-bit color digital-video movies, sequences, and clips. Smooth, lifelike video running at 30 frames per second — it's motion-picture quality! VideoSpigot opens the door to a world of possibilities. Audio and video are automatically synchronized for tight sound. Presentations, storyboards, training, education, and promotional materials explode off the screen! And because this is full digital video, you get unbelievably crisp detail and rich, luscious color.*

Put a video clip in a word-processing document to describe a procedure or explain a policy. Include video clips in your desktop presentations to add customer testimonials, video sidebars, building sites, and other additional information.

Add outdoor/location shots in presentations, create commercial "roughs," animated simulations, and other video productions. Include a "Message from the President" in your presentations. You can even put a video clip into a document — store it on an ordinary 1.4 MB disk — and send it off to a friend. Sight and sound made simple — with VideoSpigot and the power of your Mac — and your imagination.

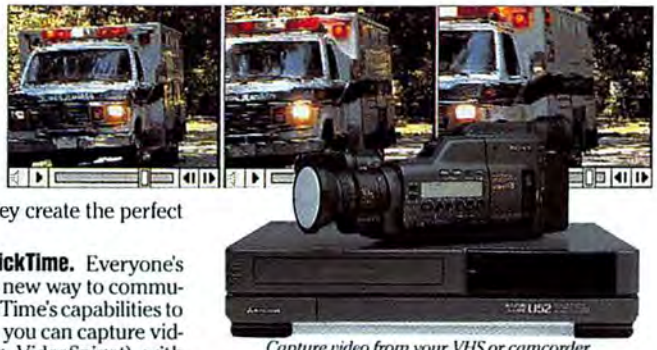
Adobe Premiere™ $695.00
Apple® QuickTime $169.00

A $864 Value FREE!
With Every VideoSpigot

Make Movies On Your Mac! VideoSpigot is easy to use... installs in seconds. In effect, you simply "pour" digital video into your Mac. Then cut, copy, and paste just like any Mac file.

In addition, your video productions can be seen over a network. Distribute movies over a LocalTalk®, Ethernet, or Token Ring network.

It's an incredible piece of technology, designed to maximize QuickTime's video capabilities. In fact, VideoSpigot and Tiger include QuickTime FREE. Tiger also includes Adobe Premiere, the industry's hot new video editing program — it's also FREE! Together, they create the perfect QuickTime starter package.



Capture video from your VHS or camcorder.

An Historic Leap: Apple QuickTime. Everyone's talking about QuickTime, the new way to communicate ideas. By adding QuickTime's capabilities to your Mac, you can capture videos (using VideoSpigot) with crisp, digital sound, and mix them with other clips and add them to documents like ordinary text files! Cut, copy, paste, and share video clips and movies easily with any application that supports QuickTime.

With Adobe Premiere, you mix audio and video together with sleek, graphical controls, ready for QuickTime to play in a window on your screen. Just gather the various clips together and quickly arrange them in the order you'd like them to play. You can combine anything: video footage, audio recordings, live sound, animation, still pictures, and graphic designs. Adobe Premiere enables you to add transitions, dissolves, page turns, spins, and more. Superimpose images in background clips and work with a palette of fascinating special effects. Create anything from a formal address to a music video. Use tints, filters, gradations, and more...

Present your best ideas — with motion and sound — right on your Mac.

Quickly cut and paste audio just like text, record edit and mix music, voices and effects. Modify sounds with echo, reverb, filtering and backwards. MacRecorder Sound System Pro is like having a professional recording studio in your Mac.

ADDITIONAL BONUS!

With Pro Bundle — SuperMac Tool Kit

The SuperMac Tool Kit contains an exciting, interactive video demonstration of one of the hottest developments in the Macintosh market today — QuickTime moviemaking with the VideoSpigot.

THE TIGER VIDEOSPIGOT PRO BUNDLE

VideoSpigot™ NuBus	$699.00
Adobe Premiere™	$695.00
Apple® QuickTime	$169.00
MacRecorder®	$349.00
Personna Micro Speakers	$80.00
SuperMac CD Tool Kit	$29.00

A Complete Package Worth $1,992!

NOW JUST $699.00

The Pro Studio Bundle includes MacRecorder® Sound System Pro and a pair of booming Personna Speakers, over $1,990 in pro-quality audio/video hardware and software for just $699!

MacRecorder® Sound System Pro enables you to record, edit, and playback live or recorded sound on your Mac. Includes built-in microphone and external microphone jack. Add soundtracks, special effects, and voice-overs to your presentations. The right effect, well-placed, can make the difference! Record and produce your own radio commercials... An unbelievable value!

VIDEOSPIGOT

BCI2478A **Mac IIsi Model**	$449.90
BCI2478B **Mac LC Model**	$379.90
BCI2478F **Mac II** Family & Quadra™ (NuBus)	$449.90
BCI2991 **The Pro Bundle**	$699.90

Includes the Complete Bundle Described Above.

VideoSpigot is a trademark of SuperMac, Inc.
QuickTime is a trademark of Apple Computer Corp.
Premiere is a registered trademark of Adobe.
MacRecorder is a registered trademark of Macromedia.

Publish-It's Desktop Publishing Challenge: Try It For Just $99.90

REVIEWER'S NOTEBOOK: *If you're about to enter the world of Macintosh desktop publishing, or if you're an experienced user who wants fast, pro-quality results without dredging through hundred-page-manuals, Publish-It! Easy is the award-winning, System-7 Savvy product that MacWorld magazine calls "...the Swiss Army Knife of desktop publishers". Now for a limited time, you'll be able to switch or upgrade to this 4-and-a-half mice rated package for only $99.90 — if you currently own a desktop publisher or word processing program. This is a $150 savings off the suggested retail price of $249.95. Simply send us the title page of the DTP or word processing manual you are currently using, and you'll own Publish-It! Easy Version 2.1 for only $99.90. Publish-It! Easy is also available in the new Corporate Network File Server Version.*

Now anyone can publish flyers, newsletters, invitations and more with incredible simplicity. This really lives up to its name: Publish-It! Easy.

The printed page. It can be an adversary or a joy. If you've got new Publish-It! Easy loaded on your Mac, you'll enjoy the process of laying out a page — and produce handsome newsletters, brochures, catalogs, reports, bulletins, advertisements, flyers, coupons and more! With the toolbox of advanced, easy-to-use features such as The Slide Show (complete with dozens of features and effects, outperforming some stand alone packages!), instant thumbnails (view and edit up to 100 pages), built-in database and mail merge, spell checker and thesaurus, your ideas will look extraordinary on paper as well as on-screen. Draw, paint, edit text, add graphics instantly and use a host of other state-of-the-art publishing tools with sleek controls. In fact, this one program eliminates the need and expense of having separate drawing, painting, word processing mail merge and presentation software — that's how incredibly full featured this package is! And don't worry — Publish-It! Easy doesn't punish you for mistakes or experimentation — it provides 5 levels of Undo to get you right back to the beginning, so you can explore other creative avenues. Print your quality pages on any Chooser-selectable printer.

Graphics From Scratch... You can also create your own graphics from scratch with 65 pen sizes, then paint them using an assortment of 32 brush sizes and an airbrush. For typographer-quality text effects, Publish-It! Easy allows you to mix typestyles, sizes and styles in any combination you like — even print grayscale or textured type to create an endless variety of unique effects. Of course, you get precise control of the kerning, leading, stretching, condensing and rotating of your type (in one-degree increments). Pop in a graphic image, and Publish-It! Easy automatically wraps text around it.

Includes FREE File-It Database... File-It is an incredibly useful database and merge program built right in to Publish-It! Easy. Now you can integrate customized information (names, addresses, phone numbers, personal notes, even entire paragraphs) into form letters you create in Publish-It! Easy. It includes three sample databases, seven professionally designed templates and an assortment of mailing label formats, so all you have to do is drop in your data and create a form letter in seconds! Preview your information before you print and retain all of the desktop publishing features (stylized fonts, rotated type, mixed text and graphics) when you create your customized documents. A powerful database takes care of all the details for you, like math, logical "if-then" functions, multiple sort levels and more. A great accessory to Publish-It! Easy that you won't find in other packages.

Corporate Network & CD-ROM Version Available!

PUBLISH-IT! EASY 2.1

BCI2470 **Publish-It! Easy 2.1 (Try It) Full Retail Special** **$99.90**
BCI2470 **Publish-It! Easy 2.1 Upgrade** **$99.90**
BCI2712 **Publish-It! Easy 2.5** Network Pack (One Network File Server, One-Node Lan Pack, plus another One-Node Lan Pack FREE) **$299.90**
BCI2719 **Publish-It! CD** **$149.90**
Any Macintosh running System 6.0 or later with 1MB RAM.

The Radius Rockets
Make Your MacII Faster Than A Quadra!

REVIEWER'S NOTEBOOK: *Radius has always been on the lips of art directors, designers and studio producers who use Macs. For years, the creative community has turned to Radius to speed their work and enhance their creativity. As an authorized Radius dealer, Tiger presents The Rockets: advanced Motorola 68040 processing power at a new lower price.*

The Radius Rocket Accelerators provide lightning quick speed for Mac page layout and publishing applications. The Rocket 25 straps on 25MHz processing capabilities and includes a math co-processor. The Rocket 25i is a more affordable accelerator, but without a math co-processor. Then there's the Rocket 33 — featuring the fiery rage of Motorola's 33MHz 68040 processor.

The Rocket 33 clocks in at over 32% faster than the Quadra 700 upgrade's 25MHz "040." (COMPARE VALUE! The Rocket 33 is over 32% faster than the Quadra 700 upgrade and is hundreds of dollars less!) The Rocket 33 is the right board for 3-D modeling, popular animation applications, publishing and image processing programs.

RADIUS ROCKETS

BCI2780 **Rocket 25 Accelerator** **$1799.00**
BCI2781 **Rocket 25i Accelerator** **$1349.00**
BCI2782 **Rocket 33 Accelerator** **$2199.00**

Buy A Color Pivot, Get A $599 Color Display Card Free!

REVIEWER'S NOTEBOOK: *The revolutionary Radius Color Pivot Display is the only monitor that works the way you do — in both portrait and landscape modes. See a full page without scrolling. A spectacular value! And for a limited time, Tiger will throw in the Color Pivot video interface card, a $599 value — FREE!*

The immortal Radius Color Pivot. The only monitor in the world that can display a full page in color and pivot to display a full page landscape too! Ask a pro how much easier that makes his life. Now your Mac can have this freedom.

The Color Pivot is perfect for design professionals and advanced desktop publishers, but it's also an ideal upgrade for everyday use, especially if you're "in and out" of a variety of applications. Just pivot to see as much of the screen as you need. And it is an excellent value. Consider this — the only other way to see a full page in actual size without scrolling would be to buy a 19" or larger display — many hundreds of dollars more than the Color Pivot!

Team the Color Pivot up with a Radius video interface and you get an unbeatable duo. 256 vibrant colors on any Mac LC, SE/30, IIsi and all NuBus Macs.

So, if you need a color display solution, you can spend $2298 on a landscape display system from Apple. Or for only $879, buy the Color Pivot, and get both a portrait and landscape display in one for about $1419 less. How's that for value?

RADIUS COLOR PIVOT

BCI2784A **Color Pivot LE Monitor** **$879.00**
BCI2784B **Display Card for SE/30 Models** ($599 Value) ..... **FREE**
BCI2784C **Display Card for Si Models** ($599 Value) ..... **FREE**
BCI2784D **Display Card for Mac II Family & Quadra** (NuBus) ..... **FREE**
BCI2784E **Display Card for LC Models** ..... **FREE**
Your Color Pivot LE includes a FREE interface card. Please specify your Macintosh model when placing your order so we may ship you the appropriate interface card.

Returns for exchange only.

Link PowerBooks To Large Color Displays!

REVIEWER'S NOTEBOOK: *For PowerBook users who want a clean, crisp connection to external color displays, the Radius PowerView is the perfect instrument. Lightweight, small and built to survive an airport cargo crew, the PowerView displays up to 256 colors and plugs into your SCSI port.*

A must for PowerBook users on the run. PowerView is an external color display interface for 140 and 170 'Books. Just plug it into the PowerBook's SCSI and you're ready to go.

RADIUS POWERVIEW

BCI2783 **PowerView Interface** **$535.00**

Returns for exchange only.

High-Quality Video
Directly From Your Mac!

REVIEWER'S NOTEBOOK: *This one amazing board add a new dimension to multimedia. This new technological leap turns your Mac into a video editing workstation. Full-motion video in from any VCR — full-motion video out. Integrate high-quality audio, video and graphics and output them to videotape, playable on any VCR — with absolutely NO flicker!*

RADIUS VIDEOVISION

BCI2921 **VideoVision** **$2219.00**

Adobe Illustrator, Streamline And ATM: Just $399.

ADOBE ILLUSTRATOR: A slew of impressive industry awards grace the Illustrator box, a clue to the amazing capabilities you'll discover inside. Indeed, Adobe Illustrator is the most powerful drawing, page design and production tool in the world today, ideal for designers with a desire to elevate their work to a new vista of speed and creativity. It's the only system capable of precise illustrations, extensive text handling, fully automatic graphing and color separations. You can work from existing images if you like — just scan it and you're ready to begin. Or draw from scratch using Illustrator's magnificent set of drawing tools, the envy of the industry. It's as simple as moving the mouse.

Professional pages depend on the ability to handle text in a variety of ways. (This package includes free Adobe Type Manager and 13 type faces). Nothing allows more creative opportunities than Adobe Illustrator when it comes to integrating text with your designs, illustrations, line art, images and photos. Just enter your text on screen, or quickly import it from your word processor.

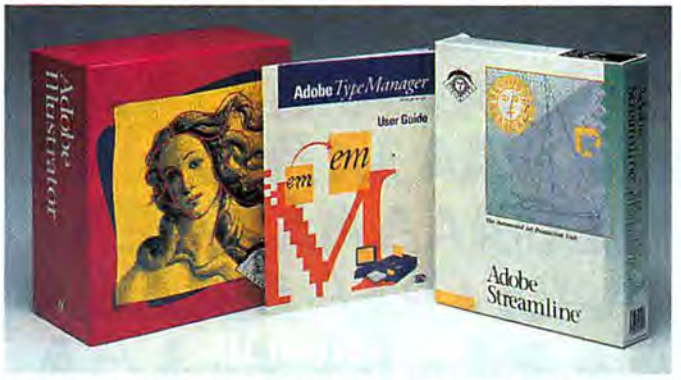
Create tight wraps around shapes (or any path, like circular type) and images, viewing your alterations on your screen as you work. Flow text between columns, add unlimited numbers of characters and styles from any PostScript Type 1 font (including the entire Adobe Type Library). You can even convert the type to outline images and then edit them.

Creating charts is a snap with Illustrator. Just type in your data, select a chart type and it's done. Customize your charts with your palette of creativity and revise them in just a few seconds. You'll create top-notch ads, brochures and more, from concept to final production and color separations. In fact, the Adobe Illustrator box was completely created using the product. Color capabilities include smooth 24-bit screen reproduction (8-bit is supported for B&W).

ADOBE STREAMLINE. Producing high-quality PostScript artwork on a Macintosh has never been easier — provided you have the right tools. Adobe Streamline software is one of those tools. In fact, it's the easiest way to guarantee you'll always have PostScript quality, no matter how you start.

The Adobe Streamline software is a computer graphics tool that literally *streamlines* the production process by converting high-resolution bitmapped images (from existing files, scanned black and white line art, or continuous-tone images) into Encapsulated PostScript, PICT, DXF or Adobe Illustrator files. You can convert one image at a time, or quickly convert an entire folder of images in batch mode.

Once you've converted the images, you may use them as-is, export them to your favorite page layout program, or modify them in a drawing program such as Adobe Illustrator — saving you hours of tracing and copying by hand. That's why Adobe Streamline is the perfect tool for technical illustrators, destop publishers and graphic artists.



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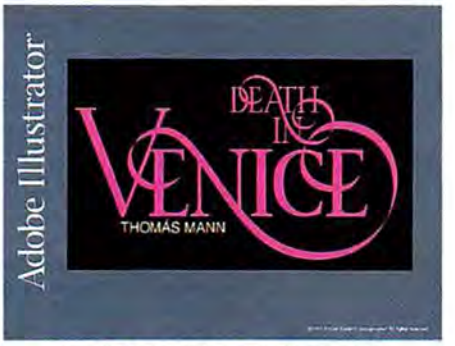
ILLUSTRATOR TYPE MANAGER AND STREAMLINE 2.0

Great illustrations with precise details.



Incredible typographic illustrations are fast...

HERE'S WHAT YOU GET
ADOBE EXCLUSIVE BUNDLE

Illustrator	$595.00
Streamline 2.0	$195.00
Type Manager	$99.00

A GRAPHICS BUNDLE WORTH $889
For Just $399

ADOBE

BCI2960 **Illustrator** with Streamline 2.0 and Type Manager . . **$399.00**
Mac with hard disk; minimum 2MB RAM for System 6.0.5 or greater — 4MB RAM for System 7.

ADOBE PREMIERE 2.0! UPGRADE NOW FOR: JUST $149

REVIEWER'S NOTEBOOK: *In addition to the two industry standards reviewed on this page: Adobe Illustrator and Adobe Streamline, TigerSoftware is proud to be among the first to offer new Adobe Premiere Version 2.0, an incredible new title that allows you to combine video footage, audio, animation, still images and graphics to produce digital movies on your Mac. Uses Apple's QuickTime media-integration technology, so multi-unit production hardware isn't required. Adobe Premiere is fast, fun and yields high-quality results. Interactive presentations, television ad concepts and roughs, video databases, merchandising sequences and training sessions are just a few of the wide-ranging uses for this hot new title.*

Become a movie maker — with the help of your Mac — and new Adobe Premiere. It's the newest creative tool from the leaders in precision graphics and photo manipulation. It's fast, easy and fun to use — just gather your clips and arrange them in the order you want them to play and Premiere handles the rest with blazing speed.

Premiere utilizes the Apple QuickTime extensions to store and import your video and audio files. You can arrange your clips to appear in progression with simple cuts, or overlap them to create dramatic transitions like dissolves, page turns and spins. You can isolate areas of your moving video or still images and superimpose them onto other clips to create a wide range of special effects that will grab your audience like nothing else they've ever seen.

You can use plug-in filters (including Adobe Photoshop-compatible filters) to produce tints, distortions and replications. Using Apple's QuickTime extensions, you get the enormous capabilities of true media integration — and now, you can produce digital movies at an affordable price, for a variety of uses. And with QuickTime, you can store video footage and accompanying audio on an ordinary disk drive.

Premiere acts as the control room for your movie studio. From its intuitive interface, you'll see the tracks of your movie in "filmstrip" style. And if you need to make a change, multiple windows provide you with fast access to any editing function. Want to add an effect? Just click any one of the animated icons to select great digital effects. The video windows on your screen also enable a quick preview of source material, digital effects and assembled video. There's even a Timeline display with zoom-in and single-frame viewing. Quickly check your sequences with Premiere's push-button controls, move to any clip instantly.

FREE QUICKTIME INCLUDED–A $169 VALUE

NEW ADOBE PREMIERE 2.0

BCI2961 **Premiere 2.0 Version Upgrade** . **$149.00**
BCI2962 **Premiere 2.0 Retail** **$499.00**
Mac II family computer; 4MB RAM; high-capacity hard drive (80 MB or more); System 6.0.7 or greater; 32-bit QuickDraw 1.2 or greater.
Restrictions apply to upgrade. Call for details. While supplies last.

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TIGERSOFTWARE

GUARANTEED LOWEST PRICES
ON ANY MACINTOSH PRODUCT

263 Display Typefaces And 100 EPS Borders: $99.95

REVIEWER'S NOTEBOOK: *What's wrong here? Was that a typo in the headline or has Tiger Software lost their minds? No typo. No mind loss. Just a great value on a complete (and we mean complete!) library of 250 Type 1 or TrueType display faces for use with any application that supports PostScript or TrueType — and that means just about every Mac application known. Includes screen fonts as well as printer fonts. Why pay more for foundry-quality type? Especially when you get these great collections of Ed Benguiat headlines and EPS borders free?*

Display typefaces — designed to attract attention to whatever you have to say. Take advantage of FontBank's staggering array of quality fonts at down-to-earth prices. 263 display typefaces and 100 EPS borders for just $99.95!

You'll create attention grabbing documents and eye stabbing graphic elements for any graphics program and desktop publishers. With such a wide variety of faces available to you, creating incredible headlines is fact, fun and amazingly professional. The headline is the face of good advertisements. Wimpy headlines are usually ignored, while bold headlines attract the reader, and if your message is important, the casual reader becomes curious — and persuaded. Remember, though, that headlines must be legible. If you'd like to know more about working with display faces and creating winning headlines, call TigerSoftware and ask for a free copy of a 24-page book that we've prepared entitled "A Short Course On Working With Type." It has been prepared by the typographers at Tiger and we'd be happy to get one in the mail to you.

FontBank has assembled a vast array of looks and feels in their type library. 250 different faces, each with its own distinct character. Some you may never have seen before. Combining FontBank's 250 faces with the capabilities of these programs offers the opportunity for an unlimited number of special effects. And FontBank display faces are compatible with all major page layout applications like QuarkXpress, PageMaker, Illustrator, FreeHand and ATM.

Regardless of what the design assignment, from flyers, posters, ads, coupons and greeting cards, to presentations, notices, memos and packaging, FontBank display typefaces give you the typographic tools you need to look your creative best. And, when converted to editable outlines using Illustrator, FreeHand or PageMaker 3.0, these faces can be used to produce special text and design effects to create stunning documents.

How long have you been using the same tired typefaces? Chances are, you use what you have because finding the right typefaces, installing them and learning to use them is more trouble than it's worth. so you compromise the overall look of your document by compromising on the one critical factor: the type. That's why FontBank is such an exciting product, easy to install, a pleasure to use — and a low cost way to improve the quality of everything you print.

Borders Complete Your Layout. Often the only thing between you an an attention getting layout is the lack of some visual ornament to pull it all together. Usually the answer is a border. But how many of us have the time to draw a border as the clock moves ever closer to the deadline hour?

Recognizing that need, FontBank has introduced BorderBank, a collection of 100 imaginative, attention-arresting borders in EPS (Encapsulated PostScript) format.

It's yours free when you order the Fontank Type Companion.

Designed by DTP guru T. Craig Smith, the BorderBank collection is an ideally quick and simple way to add a border to your ad, coupon, sidebar or just to pull your whole layout together.

The designs run the gamut from the traditional to cutting-edge contemporary. And using them is as simple as placing any graphic within your page layout or drawing program. Since they're EPS graphics, they proportion perfectly to whatever area you assign them to.

And they're yours free when you purchase the FontBank type Companion.

Total Design Power. There you have it. For $99.95, you can buy the FontBank Type Companion with its 250 display typefaces — and get 100 EPS borders designed by T. Craig Smith free. And with a little imagination you'll be creating layouts that make people do what you want them to do.

FREE! 100 EPS BORDERS $149 VALUE

No question about it: borders add excitement to your layouts. Order the FontBank Type Companion and get the collection of 100 EPS borders designed by DTP guru T. Craig Smith FREE! They are compatible with all page layout and most drawing programs.

Tiger Special Offer

FREE! Send in your FontBank registration card and get these 13 Photo-Lettering, Inc. Faces FREE! Chosen and edited by world renowned type designer Ed Benguiat. Also available separately for $9.95.

FONTBANK

BC12425 **FontBank MAC**
With Free BorderBank **$99.95**
Call for details.

Call Us: **1-800-666-2562** Int'l Orders: 305-443-8212 Fax: 305-529-2990 *WE SHIP FEDERAL EXPRESS*

CIRCLE 139 ON READER SERVICE CARD.

MOUSEMAN/KIDZ MOUSE

Logitech MouseMan is not just another mouse. It is the most sophisticated pointing device in the industry today, featuring three fully programmable buttons, sleek ergonomic design and the highest quality craftsmanship. MouseMan's 400 dpi hardware resolution makes the most efficient use of your desk space and it plugs right into your mouse port.

Logitech has been concentrating on creating the perfect desktop mouse since 1984, and today they're the largest manufacturer of pointing devices and scanners in the business. If you think all mice are the same — you haven't seen a Logitech MouseMan. MouseMan comes complete with enhanced MouseWare software utilities provide powerful menuing capabilities, assignable hot keys.

LOGITECH MOUSEMAN

BCI2200 **MouseMan for Mac** . . **$79.90**
BCI2589 **Kidz Mouse** **$49.90**

TRACKMAN

The Stationary Mouse of the 21st Century! The most advanced design, the most precise movement — perfect for limited-space desktops. The ultra-ergonomic shape comfortably accommodates your hand for sleek, swift movement. It's from Logitech.

Perfectly engineered for your hand, TrackMan allows your fingers to rest on the buttons as your thumb controls the ball. Highly precise, extremely comfortable — and smart as a whip.

If you work with graphics and page layout software, TrackMan is the ideal instrument; it lets you get right in there and tweak pixels, clean up photos and artwork, perform detailed stripping and color manipulation. TrackMan eliminates the "shifting" that occurs in other instruments.

LOGITECH TRACKMAN

BCI2210 **TrackMan for Mac** . **$89.90**

FOTOMAN COMPUTER CAMERA

What is it? In short, it's a portable, digital camera — for your computer. Logitech FotoMan takes great pictures with amazing clarity and 256 grayscale richness — then allows you to instantly download them to your Mac. It includes a slew of image editing tools that open a world of creative opportunity, and is compatible with virtually all desktop publishing programs. The applications for this new technology are enormous. Insurance and real estate professionals are using it to expedite claims and transmit photographs of neighborhoods and homes. Manufacturers use FotoMan to quickly catalog products and parts, while law enforcement officials are using it to photograph suspects, crime scenes and evidence — without the time and expense of film, processing and prints. Digital images are instantly captured and merged into documents, or stored as a permanent record. Up to 32 images can be shot and stored on the FotoMan's RAM chip, then transferred via serial port to FotoTouch or previewed on your screen.

One of the hottest new ideas in computing: the digital photograph — taken by a small, portable and easy to use camera that allows instant transfer to your computer — without a buying any other hardware.

INCLUDED FREE!

DIGITAL DARKROOM 2.0

Perform amazing editing feats on scale images with Digital Darkroom 2.0. It now supports image, scanner, and printer calibration.

A $395 Value FREE

LOGITECH FOTOMAN

BCI2585 **MAC FotoMan** with Free Aldus Digital Darkroom . . **$649.00**
Call for system requirements.

SCANMAN 32

WITH DIGITAL DARKROOM AND CATCHWORD PRO: ALL THREE JUST $399

REVIEWER'S NOTEBOOK: *The ScanMan Bundle begins with the instrument itself: the Logitech ScanMan 32 grayscale scanner. It's a marvel, packed with technical innovations and crafted into a rugged, ergonomic housing. The scans? Crisp. Clean. Perfect...*

We put the ScanMan 32 hand scanner through it's paces, performing over 50 scans of various black and white images — photos, line art, logos, type, illustrations — even poor-quality photos. The ScanMan 32 features 32 gray scale performance. Use scanned images in word processors, multi-media, desktop publishing, HyperCard, OCR and more.

The Science of Scanning. Logitech technology destroys the old barriers of scanning, increasing the speed and accuracy of anything you scan. Superior image quality, with the ability to produce halftones for reproduction. The set of output controls provide the best possible results on any printer or monitor screen. Its 4″ wide scanning area allows full-page scans with just two quick passes.

The instrument itself is a masterpiece. From the genius of the respected industrial design firm, Frogdesign — also responsible for the new line of NEC monitors and other distinctive hardware products, the ScanMan 32 is magnificent.

CatchWord Pro Included FREE!. CatchWord Pro delivers powerful Optical Character Recognition (OCR) software that captures printed, hard-copy data by scanning it, rather than typing it.

Incredible grayscale images right on your screen!

CatchWord Pro delivers an amazing 99% accuracy in OCR testing, used in tandem with the ScanMan 32. It's compatible with popular word processors, spreadsheets, databases and desktop publishers — so you can scan information directly into your application and use it immediately!

Digital Darkroom Included FREE!. Digital Darkroom from Aldus is the most complete grayscale image processing software for retouching, enhancing, composing, and modifying scanned photographs and other bitmapped graphics on the Macintosh.

THE SCANMAN 32 BUNDLE

ScanMan 32 with
CatchWord Pro **$599.00**
Aldus Digital Darkroom **$395.00**

A Scanner Package Worth $994.00
FOR JUST $399

BCI2977 **ScanMan 32 Bundle** with FREE CatchWord Pro & Digital Darkroom **$399.00**
Call for system requirements.

The WriteNow Hot-Pack!

REVIEWER'S NOTEBOOK: *WriteNow is the word processor Mac aficianados swear by — it's fast, compact (requires just 325K), reliable, and brimming with great new features that give every document that you create an absolutely stunning look. NEW! Paragraph and character style sheets help you create a clean, consistent look. NEW! An incredible print preview that displays thumbnails and facing pages — optimized for your particular screen's size. NEW! Color text and graphics, along with new styles and graphics capabilities. NEW! One-step default document creation — just throw in the text and out comes a masterpiece.*

If you're a Word user, just try WriteNow 3.0 and see what you're missing. From page layout and design, graphics and document management to printing, System 7 support and great style sheets. It just feels so nice. The columns snap to attention as you enter text, the headers and footers pop into exact position, the formatting and style sheets are crisp and professional — and WriteNow contains a giant 1.4 million-entry thesaurus, a 135,000 word spelling dictionary with ultra-convenient Auto-Find and Auto-Guess spell checking. WriteNow is compatible with other leading applications such as Microsoft Word, Works, MacWrite and WordPerfect (For DOS). There's more new stuff: lightning-fast scrolling for easy movement throughout your documents, unlimited paragraph and graphic sizes, triple-click paragraph selection, style sheet design templates, virus alert and more.

WriteNow is perfect for everyday letters, memos and reports. Easy-to-understand menus are the key.

The Lean And Mean Word Processor. WriteNow has swept the industry, collecting Editor's Choice awards and other top honors. Known for it's incredibly swift performance and compact size. But despite the lack of size, WriteNow contains a complete set of state-of-the-art features. Everything you need is here — with powerful new page design features (that you'll actually use) to create great looking letters, memos, reports, presentation handouts and more. The print quality is excellent.

Great Looking Print Preview! The print preview is remarkable, featuring optimized thumbnails, multiple page viewing, facing pages (reader spreads), and speedy magnification.

ONLY FROM TIGER!

THE WriteNow "HOT-PACK" Bundle!

Only Tiger can assemble a sizzling offer like this! Award-winning WriteNow 3.0 is joined by four great software titles — each best-sellers in their own right. First, you get Fax Mania — it includes scores of high-quality, professionally designed fax cover sheet templates. There's one for every mood, event, occasion and situation. From formal to freaked-out! — it's a $39.95 value. Then there's Grammatik, the trusted grammar and style checker that gives your writing clarity and power. Easy to learn and use, you'll notice an improvement the first time you use it — a $99 value.

Record Holder Plus is the sleek, simple-to-use data manager than enables you to organize, store, retrieve and report information. It's a snap to put your information to work; let Record Holder Plus take care of it — a $145 value. To round out the Hot-Pack Bundle, we've included MacMoney, the fast, easy — yet extremely powerful accounting program specifically designed for the needs of home and small business. Point-and-click operation makes organizing your finances a breeze. Includes excellent reporting features and zippy data entry.

The WriteNow Upgrade
HOT-PACK BUNDLE

WriteNow 3.0	$249.00
Mac Money	$119.95
Record Holder Plus	$145.00
FaxMania	$39.95
Grammatik Mac	$99.00

A Software Bundle Worth $652.90!
NOW JUST $99.90

WRITENOW

BCI2966 **WriteNow 3.0 Upgrade "Hot-Pack" Bundle** $99.90

THE NEW 256K SHARP WIZARD!

REVIEWER'S NOTEBOOK: *Imagine a 256K device the size of an ordinary checkbook. The new Sharp Wizard packs a powerful whallop, enabling you to organize more information faster and easier with the help of its amazing built-in functions.*

It wasn't so long ago when 256K was the accepted memory standard in the computer industry. Now you can slip it into your briefcase...

Only Sharp could have brought such an impressive technological achievement to the world. The Wizard OZ-8600 features an extra large, high-contrast display that measures a whopping 40 characters wide by 8 lines deep. There are 10 built-in functions (all superbly integrated): A Scheduler (with alarm), a To-Do List, 3 different Calendar Views, 3 Phone/Address Books, a Business Card File, Memo Pad, Outliner, Home and World Time Clocks and Calculator with paperless printer.

The OZ-8600 also features helpful on-screen instructions and can easily store over 5,500 names and numbers or over 3,800 scheduled appointments!

With more than 25 optional software cards available, the OZ-8600 becomes everything from a travel planner to a financial assistant to an arcade. With the optional interface and transfer cable, this tiny heilcat will exchange information with your desktop applications. Communicate with Macs or send faxes with the optional modem.

All of which makes the new Sharp 256K Wizard the perfect partner.

Organizer Accessories There's an optional modem, printer, fax and a slew of software cards that turn the Wizard into a fully functioning office.

Expand The Sharp's Mind When you add software and memory cards to your Wizard, you put all kinds of possibilities at your fingertips.

Time Expense Management A must software add-on for the Wizard. The powerful way to manage and prioritize your schedule, track your expenses and deadlines, and account for time spent on projects or client meetings.

Spreadsheet Create fully functional, Lotus 1-2-3 file compatible, 26-column-by-999-row spreadsheets on your Wizard, or download a spreadsheet from your Mac! This card will hold 64K of data! Built-in features include: 10 templates, complete formatting, sorting and "freezing pane" functions, and financial calculations, spreadsheet-linking capabilities, cut & paste.

NEW Spanish/English Dictionary Just Released! The fast, handy Spanish/English translation software for use with your Wizard.

SHARP WIZARD

BCI6310 **ZQ-5200 Sharp Organizer**	$179.00
BCI6306 **OZ-7620 Sharp Wizard**	$229.90
BCI6312 **OZ-8000 Sharp Wizard** 64K	$279.00
BCI6309 **OZ-8200 Sharp Wizard**	$339.00
BCI6307 **OZ-8600 Sharp Wizard**	$449.00
BCI6313 **Organizer Modem**	$139.00
BCI6314 **Organizer Talker** (7000 Series Only)	$85.00
BCI6315 **Organizer Fax Modem**	$389.00
BCI6320 **Time Expense Management**	$89.00
BCI6321 **Dictionary/Thesaurus**	$99.00
BCI6355 **American Heritage Dictionary**	$156.00
BCI6322 **8 Language Translator**	$75.00
BCI6323 **Money Planner**	$75.00
BCI6324 **Spreadsheet**	$139.00
BCI6330 **Box Jockey**	$39.00
BCI6331 **Organizer Chess**	$85.00
BCI6332 **Tetris Game** (7000 Series Only)	$39.00
BCI6333 **Organizer Bible**	$117.00
BCI6340 **Portfolio Card**	$99.00
BCI6341 **32K RAM Card**	$59.00
BCI6342 **64K RAM Card**	$99.00
BCI6345 **128K RAM Card** 7000-8000 Series Only	$119.00
BCI6347 **IBM Organizer Link II**	$99.00
BCI6348 **NEW MacIntosh Organizer Link II**	$85.00
BCI6352 **Battery Pack** (for 8000 Series)	$26.00
BCI6353 **Printer**	$119.00
BCI6354 **Dubbing Cable**	$24.95
BCI6356 **NEW Spanish/English Dictionary**	$99.00
BCI6357 **Backgammon**	$69.99
BCI6358 **Hatris**	$49.99

Returns for exchange only.

LEARN TO PLAY THE PIANO IN 30 DAYS!

REVIEWER'S NOTEBOOK: *It seems like everyone is talking about the Miracle Piano Teaching System. It's been featured on "Good Morning America," "The Today Show" and "The Arsenio Hall Show." It's been written about in Newsweek and The New York Times. It's become popular because it really works — anyone, at any age — can learn to play piano and achieve musical literacy in just a very short time. More importantly, they can learn at their own speed, without formal lessons — by connecting the Miracle to their Mac.*

So how does it work? It's actually very simple. The Miracle software contains game-like exercises that make learning fun. Like the shooting range that knocks off ducks when you hit the right notes. You'll learn to play chords as parachutists jump out of a plane and learn melodies by repeating back what the Miracle plays. It's so much fun that you'll actually forget that you're learning. The next thing you know, you'll be playing your favorite songs. The Miracle provides instant feedback as you go, recognizing problem areas and bringing up specific drills to help you get it right. If you're struggling in a certain area, The Miracle continues to provide arcade-like lessons in that area until you get it right. It's not boring, tedious labor — it's actually fun. And that means faster learning and visible progress.

When you've mastered a specific skill, The Miracle quickly moves on to the next level, with new games, vivid new screens and new musical concepts.

If you love music, and always wanted to play the piano — here's you're chance. And it's never too late to learn with The Miracle, adults learn as quickly as children because they work at their own speed, building on skills quickly — on their own schedule. It's the power of your computer at work in an important role: learning.

TigerSoftware sweetens The Miracle's charms with a bundle that's simply unbeatable. You get the Miracle keyboard, software — plus the Miracle Song Collection so you can play along with your favorites from The Beatles, Michael Jackson, Buddy Holly, Lionel Richie, George Michael and more. We'll also include the Miracle Keyboard stand, stereo headphones and a copy of TRAX, the advanced MIDI recording software that transforms your computer into a multi-track recording studio. With TRAX, you can record and mix multiple tracks, add additional instruments and effects, add vocals, change the tempo—and do it all from your keyboard. Record up to 64 tracks with a host of tape recorder-like controls. Compose and edit your own tunes by just cutting and pasting notes on your screen. TRAX is simple to use and delivers professional results.

It's everything we could possibly think of to compliment the Miracle's amazing capabilities. And it's all free from Tiger with The Miracle all for just $379.00.

The joy of making music... now you can experience that thrill with the Miracle Piano Teaching System, the world's most advanced multimedia training system.

The Only Self-Teaching Piano. The Miracle Piano Teaching System can teach anyone — child or adult — to play the piano with a series of progressive, customized lessons. The Miracle quickly connects to a Macintosh and includes software cartridge that combines an advanced MIDI keyboard with full-stereo sound and brilliant on-screen graphics. In no time at all, students of all ages will learn and perform left and right handed melodies — while having a lot of fun!

There are exercises, musical pieces and drills (cleverly disguised as games), that teach hand positions, notes, fingering, rhythm, scales and more. The Miracle can be quickly set up for any age or expertise, and customizes itself to move the user along at a comfortable pace.

Unlike conventional piano lessons, The Miracle eliminates boring, repetitive routines. The super-creative, artificially intelligent software quickly teaches the basics and builds on them in very entertaining ways. And that makes all the difference.

The Keyboard. Dazzling music! Spectacular effects! Booming orchestras — all created by you and the Miracle keyboard. As a stand alone instrument, The Miracle rivals the music industry's most sophisticated MIDI consoles. The 49 full-size keys are velocity sensitive, so you can learn to play utilizing true piano expression. You also get a foot pedal, which controls the length of time each note is sustained and stereo earphones.

Here's What You Get Free With The Miracle — Only From TigerSoftware. When you buy a Miracle from TigerSoftware, we'll throw in everything you need to create your own recording studio. We'll start with the Miracle Song Collection Volume 1, containing dozens of popular songs from the Beatles, to Michael Jackson. Play along with your favorite songs, or break out into your own solo. These song collections are a great value and are yours free only from Tiger.

Then we add a copy of TRAX, the MIDI recording software that allows you to create your own smash hits. Change the tempo, mix different instruments, add your own vocals, sound effects and more — controlling it all from your keyboard. The TRAX interface is simple and fast, enabling you to lay down tracks using your Miracle to create your own arrangements.

But That's Not All. You also get the Miracle keyboard stand. With all this, you'll be ready to create your own live performance or cut your own record.

With The Miracle, you or your child can learn to play without the boring drills and monotonous practice that music usually requires.

So not only do you enjoy the benefits of the world's most exciting piano teaching system, with The Miracle Song Collection, you get an educational jukebox with 40 more ways to play to learn instead of just learning to play.

Song Collection Volume 1. *All Night Long* (Lionel Richie); *Another Part of Me* (Michael Jackson); *Bad* (Michael Jackson); *Billie Jean* (Michael Jackson); *Born To Be Wild* (Mars Bonfire); *Careless Whisper* (Andrew Ridgley, George Michael); *Celebration* (Kool and the Gang); *Could It Be I'm Falling In Love* (Melvin Steals, Mervin Steals); *Do You Want To Dance* (Gene McFadden, John Whitehead); *Dreams* (Stevie Nicks); *Everyday People* (Sylvester Stewart); *Forty-Second Street* (Al Dubin, Harry Warren), and more...

THE TIGER MIRACLE PIANO SUPER BUNDLE

Miracle Piano Teaching System	$347.00
Miracle Stand Shown Above	$35.00
Miracle Song Collection	$49.95
Trax MIDI Studio Software	$100.00
Trax Song Collection	$29.00

A Music Package Worth $560!

NOW JUST $379.00

Tiger's Miracle Piano Super Bundle

BCI2778 **Tiger's Miracle Piano Super Bundle**	$379.00
Includes Miracle Piano Teaching System Worth	$347.00
Miracle Stand Shown Above Worth	$35.00
Miracle Song Collection Worth	$49.95
Trax MIDI Studio Software Worth	$100.00
Trax Song Collection Worth	$29.00

Total Value $560 On Special For Only $379

The Miracle Piano Teaching System

BCI2970 **Miracle Piano Teaching System**	$347.00
BCI3781 **K-5 Carrying Case**	$39.95
BCI2792 **Song Collection 2**	$39.95

Available for Macintosh, Nintendo, And DOS. Call For Other Models.

THE CD-ROM SHOWCASE

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EPS Professional Vol. 1. The definitive collection of CD-ROM graphic design. Includes an incredible 800 fully resizable, Encapsulated PostScript images. From the graphic design studios of Christopher Marshall Designs (CMD) and LasArt, EPS Professional contains design elements for T-shirts, alphabetic designs, four-color pieces, covers and backgrounds. Supports PostScript laser printers, imagesetters and other high-end output devices.

Space Time & Art. 300 fascinating 24-bit color images on the subject of space. Great disc — hours of exploring is in store for you — see NASA views of space and photos from Voyager missions along with a collection of astonishing original images by Josepha Haveman.

Font Fun House. Hundreds of fonts, ready to use! Shareware and freeware fonts that capture any mood or make any statement. Go crazy with all kinds of faces from elegant to outrageous! Also includes screen font libraries from AGFA and Adobe. This is a great collection, and a must-disc for desktop publishers. If you can't get enough fonts, then Font Fun House is for you.

Ocean In Motion. A fascinating collection of enchanting coastal clips in QuickTime from artist/photographer Josepha Haveman. Over 200 QuickTime movie sequences of the thunderous beauty of the place where the ocean meets the land. Includes 60 still clips for fast, easy editing. Use these movie clips for backgrounds, presentations, intermissions or just savor the power of the sea on your screen.

MACnificent 7 Education & Games. Brimming with over 280 megabytes of System 7 games and educational shareware! Contains unique "Librarian" which provides instant information about what's in those 280 megabytes. Includes over 800 games, over 400 educational programs, over 50 free demos, over 1500 games support files, over 150 sounds & sound stacks — over 5000 files in all! The best bet for children...

Winning Elections. Interested in political office? This is the perfect source for everything you'll need to know to get elected. Assembled from a number of reference works on the subject of political campaigns, Winning Elections also provides insight into the our process of government, how campaigns are funded and more. It's an intriguing disc even if you're not shooting for the White House, the State House or a County Seat.

Wayzata World Fact Book 1991. The world almanac of the Federal government, based on the CIA World Fact Book produced annually by the CIA. Covers territories, countries, protectorates and disputed land claims worldwide. All kinds of information is included: socio-economic, geo-political, demographics and more. Includes data from the Bureau of Census, Defense Intelligence Agency, Defense Nuclear Agency, Department of State, Department of Interior and US Coast Guard.

The Front Page News. Includes a year's reporting of world events — by the top news organizations — on a single CD. Over 300,000 articles, transcripts, government and business reports. Includes over 2220 Gulf War stories, 3194 on the environment, 207 on acid-rain, 490 on the FBI and over 1400 on AIDS. Updated quarterly, subscriptions available. Also contains global wire services: TASS, Business Wire, The French News Agency, Latin American News Agency, OPEC, News USA, Reuters and many more.

BBS In A Box, Vol. VI. The latest release! Another monster collection of goodies from The Arizona Macintosh User's Group and MacWizards. Includes over 9,000 Mac files in compressed format with BBS directories for 24 topics including Art, Business, DA's, Games, Gifs, Fonts, Adobe Screen Fonts, Newsletter Articles, HyperCard, Music, MIDI, Mac II, QuickTime, System 7 Tools, Telecommunications and more.

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DATA MODEM, FAX AND ANSWERING MACHINE IN ONE!

The Complete, Compact Communications System THAT USES ONE PHONE LINE.

REVIEWER'S NOTEBOOK: *No better value for the savvy businessperson when it comes to communications — one machine that does the work of three! Turn your Mac into a data modem/fax machine/answering machine! Thanks to advanced line-switching techniques, phone calls are handled appropriately whether data, fax or voice, automatically. Send e-mail, receive messages while you're away and more. Prometheus crafts three technologically superior models: The Home Office, The Ultima Home Office and The 24/96 SR Minifax.*

The compact Home Office (Tiger price just $259!) is one of the hottest devices in the industry right now. A speedster at 9600 bps send and receive, with Group III compatibility and a full-featured 2400 bps data modem, it's all you'll ever need...

The Home Office is Hayes compatible and includes MacKnowledge and MaxFax software, and all necessary cables.

The Ultima Home Office delivers all the advantages of Home Office, and gives you the additional power of 14,400 bps data modem afterburners!

Quality crafted and super advanced, Prometheus gives you state-of-the-art performance at an affordable price.

The Home Office Digital Answering Machine. Simply connect your Home Office and you've instantly got a sophisticated voice messaging system. You can easily route incoming messages to any one of 999 mailboxes! Create your own personalized announcements for a specific caller or even custom messages that play on specific dates or times. Password-protect your playbacks, playback from a remote location and minimize toll-fees with Home Office's unique TollSaver feature.

Send And Receive Faxes. Exchange fax documents with any Group III fax machine in the world. Create a letter on your Mac and zip it out in seconds — Home Office takes care of the details. With Home Office, you can receive faxes from any standalone fax machine or another fax/modem. And when you send or receive a fax, you can continue to work; the faxing takes place in the background, out of your way.

9600 BPS, Error-Free Data Transmission. The Home Office provides incredible throughput (with V.42bis/MNP) for error-free operation and world-class compression. By utilizing V.42bis and MNP technologies together, you can take full advantage of newer, high-speed modems.

The Home Office will automatically negotiate the highest possible setting with the modem you wish to call.

The Prometheus Ultima Home Office. An amazing instrument, packed with advanced technology, able to perform 14,400 bps, full duplex communications. A low-cost answer to the needs of high-speed transfers of large volumes, remote access computing and network bridging. The Ultima is compatible with a wide variety of communications packages and modems.

The 24/96 SR Minifax. It has the ability to exchange fax documents with Group III fax machines worldwide. Create a letter on your Mac and send it directly to another fax machine anywhere in the world. The 2496S/R Minifax will also allow you to receive fax transmissions from a standalone fax machine or even from another fax/modem. Sending or receiving a fax takes place in the background, so you can continue with your work until the transmission is completed.

PROMETHEUS

BCI2930 **Home Office**	$259.95
BCI2931 **Ultima Home Office**	$499.95
BCI2932 **24/96 SR Minifax**	$129.95

All modems come complete with software and cables.

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REVIEWER'S NOTEBOOK: *If you're ready to get into CD-ROM, Tiger has a spectacular offer on the fastest reader in the business. The NEC CDR-73, with a remarkable 350 millisecond response time — for just $349!*

PhotoDisk 1100 Images. PhotoDisk delivers immediate and economical access to over 400 outstanding professional digital photographs. Each one ready to publish with virtually no use restrictions. Every PhotoDisk image is ready to be used instantly in advertising, newsletters, presentations, brochures, and multimedia projects.

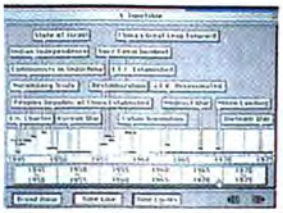
Desert Storm: The War in the Persian Gulf. The acclaimed CD that lets you experience Operation Desert Storm in full sight and sound. Chronicling the war and the events that precipitated it, it provides news reports, eyewitness accounts, photos, sound recordings, detailed maps and more.

CIA Fact Book. The CIA has been busy — collecting facts, stats, maps, sound clips and more! They've assembled megabytes of inside information on one CD and made it available to you. A seemingly endless array of information about military issues, gross national product, population, personal income, standard of living, occupations, spending and hundreds more categories. CIA Fact Book contains high-quality maps by Hammond.

The Toolworks Illustrated Encyclopedia. Critically acclaimed and widely used, The Toolworks Illustrated Encyclopedia features the entire text of a 21-volume encyclopedia — stored on a single compact disc! The Toolworks Illustrated Encyclopedia allows searches by title, word, or phrase of the latest information on science, contemporary life, law, sports, and much more. Over 30,000 articles enrich this highly regarded reference.

Software Toolworks World Atlas. This title is an almanac, world factbook and atlas — all in one! It's a remarkable package that contains the most extensive collection of full-color maps you'll find anywhere. There's also plenty of data about each country and region: rainfall, population, industry, crime and more. You can take a trip around the world in just a few minutes — great for travelers, students, educators and businesspeople! Over 240 fully-detailed, fully printable maps.

U.S. History. U.S. History on CD-ROM provides detailed coverage from a variety of historical perspectives on political, aerospace, geographic, social, military and economic history. In addition, the disc includes 1,000 photographs, maps and tables relating to historical events.



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The Family Doctor. Provides invaluable home medical information in easy to understand language from multiple sources and perspectives. In addition, Dr. Bruckheim, MD, FAAFP (a nationally recognized physician and syndicated columnist) answers over 1500 frequently requested medical questions in an easy-to-use Question and Answer format.

SuperMac Tool Kit. Contains an exciting, interactive video demonstration of one of the hottest developments in the Macintosh market today — QuickTime moviemaking with the VideoSpigot real-time digital-video capture card. Everything you need to run the demo — and experiment with VideoSpigot for yourself — is right on this CD-ROM.

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TIGER CD-ROM

NEC CDR-73

CDR 73 CD-ROM Reader	$349.00

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SuperMac Tool Kit CD-ROM	39.00
Britanica Family Choice CD-ROM	604.00
Sherlock Holmes CD-ROM	69.95
Family Doctor CD-ROM	149.95
TOTAL FOR REFERENCE KIT	**$2,807.70**

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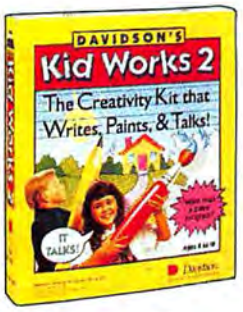

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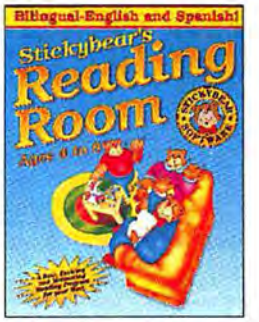

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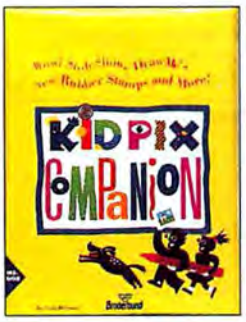

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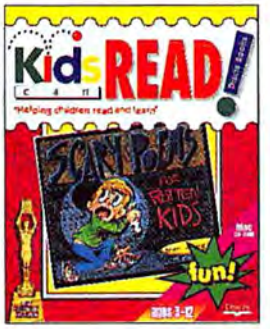

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☐ 01) 1-4 ☐ 02) 5-49 ☐ 03) 50+

2. Your primary job function is: (check one)
☐ 01) Administrative/ General Management
☐ 02) MIS/DP, Communications Systems, Programming
☐ 03) Engineering/R&D
☐ 04) Finance/Accounting
☐ 05) Marketing/Sales
☐ 06) Computer Dealer/VAR

3. For which of the following products are you involved in selecting brands/models to be bought by your company or organization? (check all that apply)

4. Which of the following products have you bought in the last 6 months? (check all that apply)

SOFTWARE	Q3	Q4
Accounting	☐ 01	☐ 01
Spreadsheets	☐ 02	☐ 02
Project Managers	☐ 03	☐ 03
Word Processors	☐ 04	☐ 04
Database Managers	☐ 05	☐ 05
Graphics	☐ 06	☐ 06
Integrated Software	☐ 07	☐ 07
Communications	☐ 08	☐ 08
Utilities	☐ 09	☐ 09

HARDWARE	Q3	Q4
Modems	☐ 10	☐ 10
Scanners	☐ 11	☐ 11
Microcomputer	☐ 12	☐ 12
Printers/Plotters	☐ 13	☐ 13
Monitors/Displays	☐ 14	☐ 14
Storage	☐ 15	☐ 15
Add-in Boards	☐ 16	☐ 16
Networking	☐ 17	☐ 17

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6. Over the next 12 months, how much will your organization spend on computer products or services? (check one)
☐ 01) over $5 million
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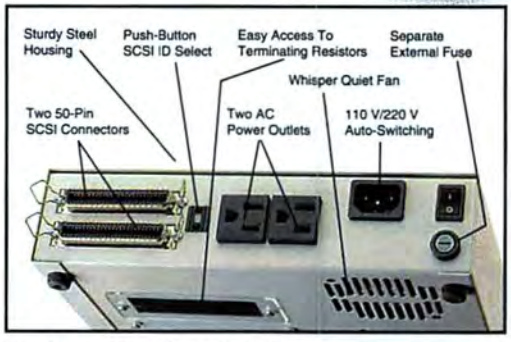

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NEWGEN PS 400P 400 DPI Laser Printer — $1695/$ 63 mo.*

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SUPERMAC VIDEO SPIGOT ..... $ 495
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88mb Cartridge		**$99**

SyQuest Drives feature: Industry standard half-height 5.25" form factor • 20 ms average seek time • Fully embedded SCSI controller • MTBF of 60,000 hours • SyQuest Drives include a **TWO YEAR Warranty, one cartridge & necessary cables, SCSI Director™ v.2.4 Formatting Utility** * Includes (1) 44mb & (1) 88mb cartridge • SyQuest Cartridges carry a ONE YEAR Warranty

Quantum

Unformatted Capacity	Model	Product Description		Actual MAC Capacity	Internal	External
52mb	LPS50Δ	3.5" Low Profile	9ms	49mb	**$215**	**$275**
80mb	Go•Drive	2.5" Low Profile	9ms	80mb	**$419**	**$519**
105mb	LPS105Δ	3.5" Low Profile	9ms	100mb	**$335**	**$395**
120mb	LPS120	3.5" Low Profile	10ms	116mb	**$409**	**$469**
120mb	Go•Drive	2.5" Low Profile	9ms	120mb	**$499**	**$599**
240mb	LPS240	3.5" Low Profile	10ms	234mb	**$649**	**$709**
425mb	PRO425	3.5" Half Height	8ms	406mb	**$899**	**$959**

Quantum Drives feature:
• MTBF of 100,000 - 250,000 hrs • **TWO Year Warranty**
ΔLow Power versions (25ms) for Classic, Classic II, LC, LC II, and IIsi available.
Quantum's Go•Drive features:
• Fast, lightweight 2.5" form factor drive designed to meet the requirements of battery-powered notebook computers • MTBF of 150,000 hours • **ONE Year Warranty,** ClubMac recommends installation by an authorized dealer to preserve warranty
• 5 volt AC Adapter $19

Maxtor®

Unformatted Capacity	Model	Product Description		Actual MAC Capacity	Internal	External
120mb	7120XT	3.5" Low Profile	15ms	121mb	**$349**	**$409**
207mb	LXT-213	3.5" Half Height	15ms	202mb	**$595**	**$655**
330mb	LXT-340	3.5" Half Height	15ms	324mb	**$969**	**$1029**
535mb	LXT-535	3.5" Low Profile	12ms	510mb	**$1219**	**$1279**
645mb	XT-8760S	5.25" Full Height	16.5ms	639mb	**$1349**	**$1449**
1.2GIG	PO-12S	5.25" Full Height	13ms	997mb	**$1799**	**$1899**
1.7GIG	PO-17S	5.25" Full Height	13ms	1433mb	**$2299**	**$2399**

Maxtor 3.5" Disk Drives include a ONE Year Warranty. Maxtor 5.25" Disk Drives include a TWO Year Warranty. * Internal Full Height Drives fit the Mac II, IIx, IIfx, and Quadra 900 only.

Tape Backup Systems

Capacity	Model	Description	Media	Access Time	External
155mb	Teac MT2ST/N50	Analog	CT600N	5-7 MB/sec	**$489**
600mb	Teac MT2ST/F50	Analog	CT600F	7-10MB/sec	**$699**
2.0GIG	WangDAT 1300XL	DAT, DDS	4mm	10-15 MB/sec	**$1329**
3-5GIG	WangDAT 3200	DAT, DDS-DC	4mm	10-15 MB/sec	**$1549**
2.0GIG	HP 35470A	DAT, DDS	4mm	10-15 MB/sec	**$1389**
3-5GIG	HP 35480A	DAT, DDS-DC	4mm	10-15 MB/sec	**$1819**
2.2GIG	Exabyte EXB-8200	Digital/Helical	8mm	10-15 MB/sec	**$1949**
5.0GIG	Exabyte EXB-8500	Digital/Helical	8mm	10-15 MB/sec	**$3229**

Includes RetroSpect v.1.3c Backup Software & One Tape
and ONE Year Warranty

5 YEAR WARRANTY

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Unformatted Capacity	Model	Product Description		Actual MAC Capacity	Internal	External
330mb	M2622SA	3.5" Half Height	9ms	314mb	**$1079**	**$1139**
425mb	M2623SA	3.5" Half Height	9ms	405mb	**$969**	**$1029**
520mb	M2624SA	3.5" Half Height	9ms	496mb	**$1189**	**$1249**
645mb	M2263	5.25" Full Height	16ms	640mb	**$1259**	**$1359**
1.2GIG	M2266	5.25" Full Height	14.5ms	1029mb	**$1899**	**$1999**
2.0GIG	M2652SA	5.25" Full Height	11ms	1665mb	**$2899**	**$2999**

Fujitsu 3.5" high performance SCSI disk drives features:
• 10MB/s data transfer rate • 6.82 ms average latency • 240 KB reed-ahead cache buffer
Fujitsu 5.25" high performance SCSI Winchesters disk drives features:
• Embedded SCSI interface • As fast as 14.5 ms positioning time • Up to 4.8 MB/sec SCSI data transfer rate

Seagate

Unformatted Capacity	Model	Product Description		Actual MAC Capacity	Internal	External
248mb	ST3283	3.5" Low Profile	12ms	235mb	**$659**	**$719**
420mb	ST1480N	3.5" Half Height	14ms	406mb	**$1059**	**$1119**
525mb	ST1581N	3.5" Half Height	14ms	500mb	**$1198**	**$1258**
1.2GIG	ST11200N	3.5" Half Height	10.5ms	1000mb	**$2119**	**$2179**
320mb	ST4385N	5.25" Full Ht W-R	10.7ms	315mb	**$1249***	**$1349**
645mb	ST4766N	5.25" Full Ht W-6	15.5ms	632mb	**$1285***	**$1385**
645mb	ST4767N	5.25" Full Ht W-R II	11.9ms	634mb	**$1549***	**$1649**
1.2GIG	ST41200N	5.25" Full Ht W-7	15ms	989mb	**$1729***	**$1829**
1.6GIG	ST41651N	5.25" Full Ht W-8	15ms	1350mb	**$2169***	**$2269**
1.6GIG	ST41600N	5.25" Full Ht **E-1**	11.5ms	1307mb	**$2429**	**$2529**
2.1GIG	ST42100N	5.25" Full Ht W-9	12.9	1900mb	**$2949**	**$3049**
2.4GIG	ST42400N	5.25" Full Ht **E-2**	11ms	2050mb	**$3649**	**$3749**

Seagate Drives include a ONE Year Warranty
* Internal Full Height Drives fit the Mac II, IIx, IIfx, and Quadra 900 only.

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Model		Capacity	Description	Seek	External
CMO-OD3000	Teac	128mb	3.5" Half Height	45ms	**$1195**
CMO-LF3004	Panasonic	128mb	3.5" Half Height	45ms	**$1185**
CMO-3100E	Ricoh	128mb	3.5" Half Height	45ms	**$1249**
CMO-3600	Ricoh	594/652mb	5.25" Full Height	28ms	**$2695**
CMO-5030E2	Ricoh	594/652mb	5.25" Full Height	66.7ms	**$2149**
128mb Cartridge		3.5" Single Sided			**$39**
594/652mb Cartridge		5.25" - 512/1024 bytes/sec			**$99**

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- 300 dpi • 6 ppm • 35 fonts
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- Auto. Interface Monitoring

2MB RAM	$159
2nd Paper Tray	$289

MultiSync Monitors

MultiSync 3FGx	$639
MultiSync 4FG	$759
MultiSync 5FG	$1359
MultiSync 6FG	$2475
Mac FG 8X Interface Card	$719
Mac FG 24X Interface Card	$1519

NEC CD-ROMs

CDR-74 Gallery	$695
CDR-37 Gallery	$529
CDR-74 with Mac Interface	$569
CDR-37 with Mac Interface	$389

radius

ClubMac Color Pivot/LE Bundle

The ClubMac Bundle combines the low cost, **15" COLOR** full pg display and the Color Pivot Interface. Provides 624 X 832 pixel resolution at 78 dpi. Available with NuBus, IIsi, LC, SE/30 or PowerView.

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Rocket 25i $1219
Rocket $1629
Rocket 33 $2029

PrecisionColor 8	$449
PrecisionColor8X	$729
PrecisionColor 8XJ	$515
PrecisionColor 24X	$1629
PrecisionColor 24XP	$515
PrecisionColor 24XK	$859
Color Pivot	$429
B/W Pivot	$249
TPD	$395
PowerView	$499
VideoVision	$2069

Displays

PrecisionColor Display/20	$2759
PrecisionColor Display/19	$2089
Color Pivot	$1289
Color Pivot/LE	$879
Monochrome Pivot	$699
Full Page Display	$579
Two Page Display/19	$899
Two Page Display/21	$1159

RasterOps

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Color Display Adapters

RasterOps 24XLi	$1939
RasterOps PaintBoard 24	$1549
RasterOps PaintBoard Li	$835
RasterOps 24Sx	$619
RasterOps 8XLi	$929
RasterOps 8XL	$465
ColorBoard 264/SE30	$699
ClearVue/GSXL	$449

Multimedia

MediaTime	$1549
RasterOps 24STV	$779
RasterOps 24MXTV	$1699
RasterOps VideoTime	$1165
RasterOps Video Expander II	$465

Monitors

20" Trinitron (2075M)	$2715
20" Color Hitachi (2085H)	$1939
ClearVue/SD 21 (with Cable)	$1399
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SuperMatch 20" Dual Mode Trinitron	$2519
SuperMatch 20" Color	$1679
SuperMatch 17" Multimode Color	$999
21" Platinum (Black and White)	$999

Graphic Cards

Spectrum 24 Series III	$1179
Spectrum 8 • 24 PDQ / PDQ si	$839
Spectrum 8 Series III	$499
Monochrome Card	$339

Digital Video Boards

Video Spigot (NuBus / Mac IIsi or Mac LC)	$499 / 415
Video Spigot Pro (NuBus / Mac IIsi)	$1335 / 1259
Spigot and Sound	$749
Spigot and Sound Pro	$1595

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Mac LC, SE/30, II, IIx, IIcx†, IIsi, IIci)

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50 MHz PowerCache with 68882 math chip	$975
50 MHz PowerCache	$1149
50 MHz PowerCache with 68882 math chip	$1415

Some models of the IIcx do not provide a socket for the 68030, it is soldered into the motherboard. Price includes socket installation on the IIcx motherboard by DayStar and return shipping UPS Blue.
†Price does not include Cache Adapter Card

Cache Cards

(IIsi model includes DualPort adapter)

FastCache IIsi	$299
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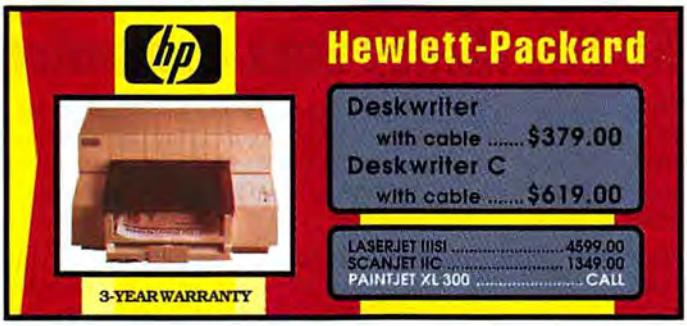

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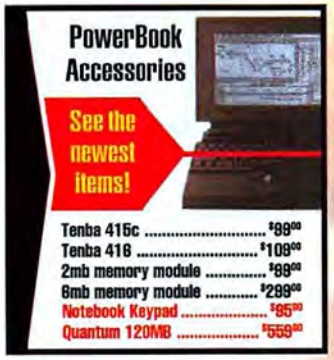

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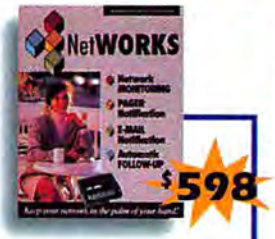

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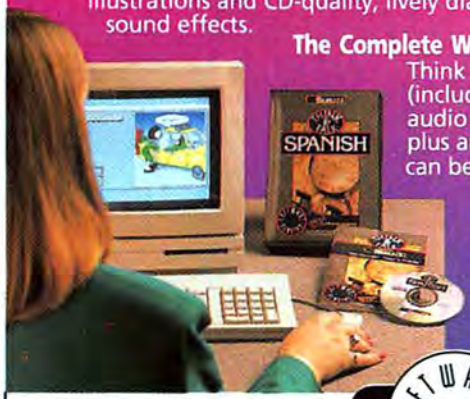

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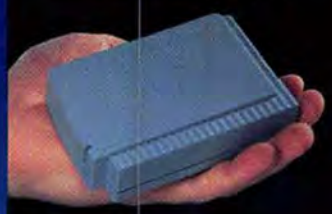

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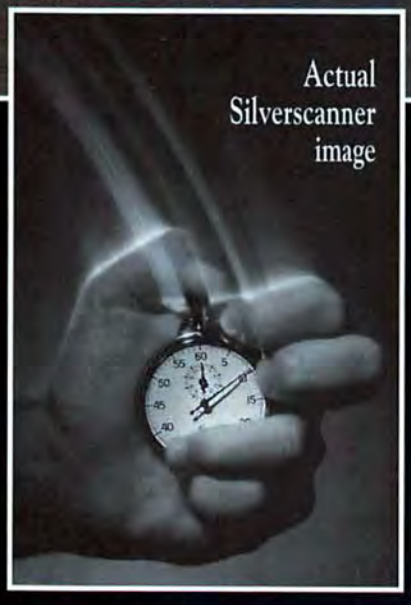

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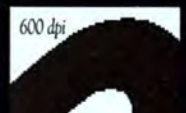

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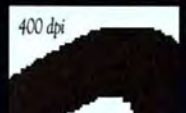

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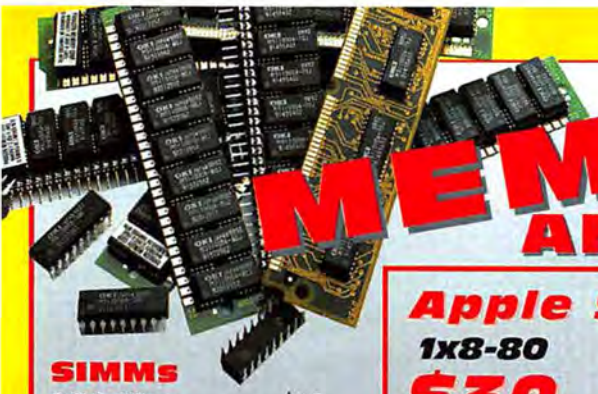

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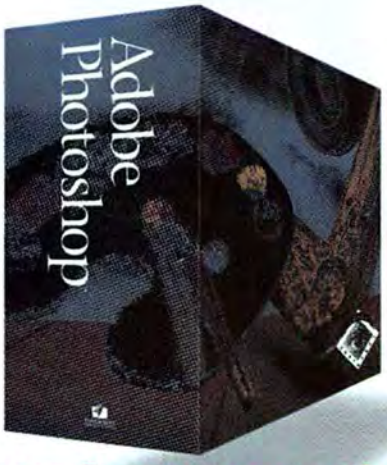

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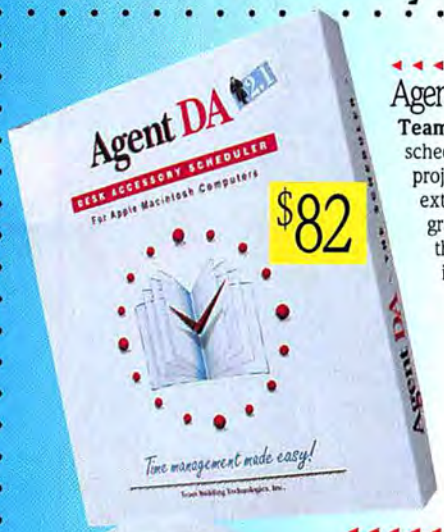

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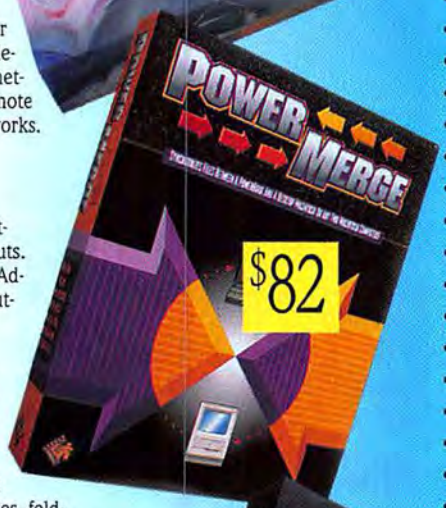

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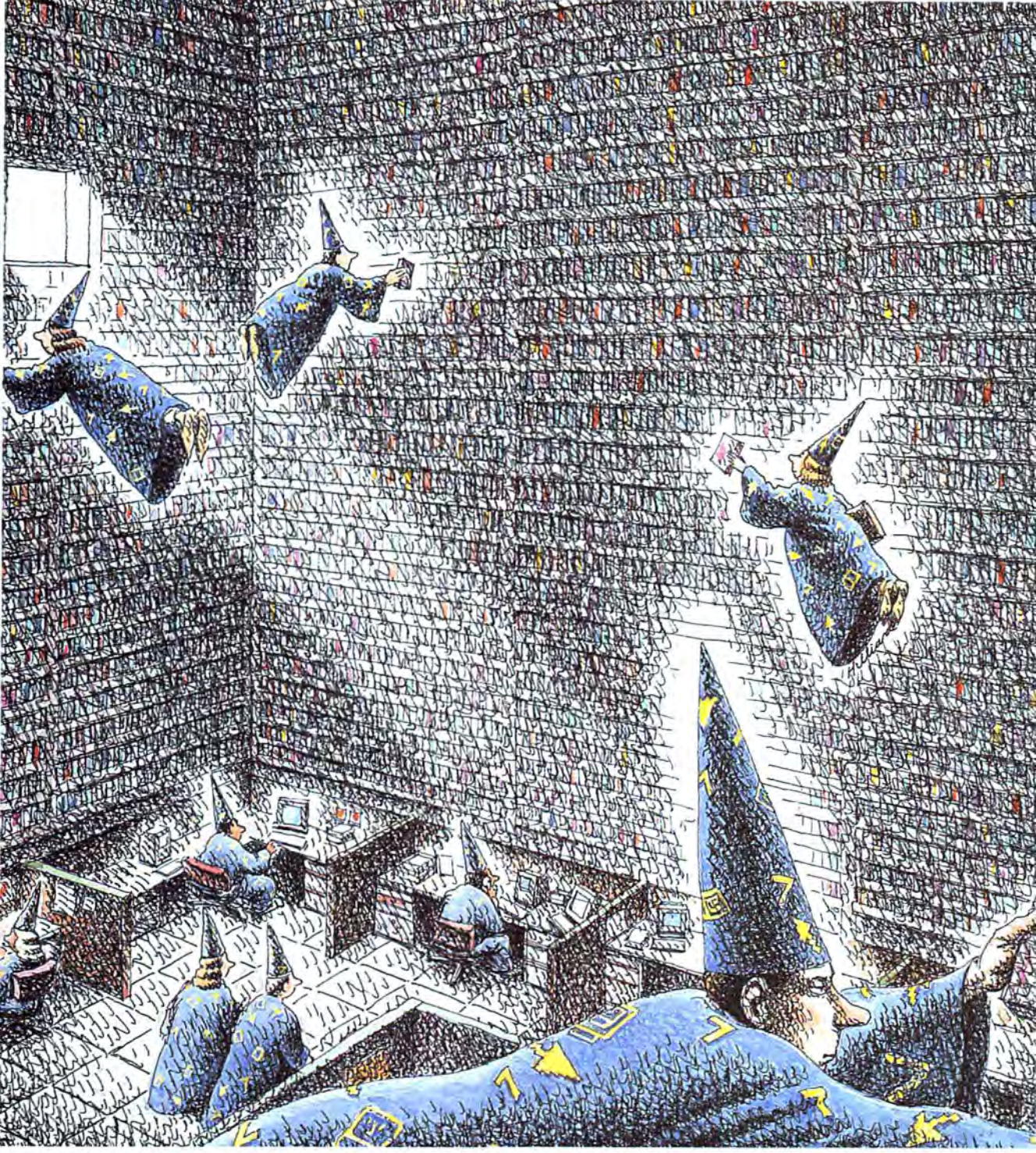

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4338 512K 59.
Sigma Designs
15" Power Portrait Monochrome
4443 Platinum 828.
SuperMac ○
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4139 Spectrum/24 1078.
4156 Spectrum/8•24 PDQ 898.
Monochrome/Greyscale Monitors
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4163 20" Dual-Mode Trin. 2698.
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4149 Spigot & Sound Pro NB1698.
4147 VideoSpigot Pro si 1348.
Supra Corp. ○
Supra FaxModem
3931 Plus MacPac 178.
4469 V.32 252.
4016 V.32 MACPAC 328.
4470 V.32bis 322.
4017 V.32bis MACPAC 378.
Thunderware
3653 LightningScan Pro 256 489.
UMAX Technologies Inc.
4260 UC 630 Flatbed 1398.
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UserLand Software
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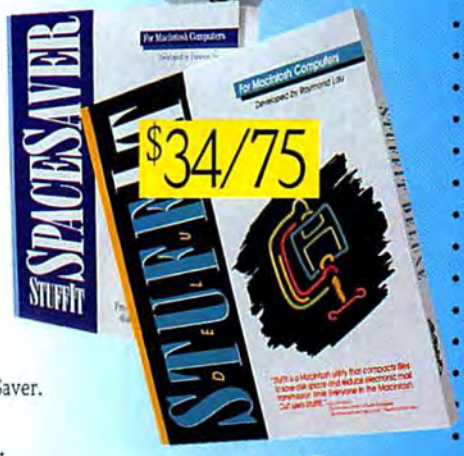

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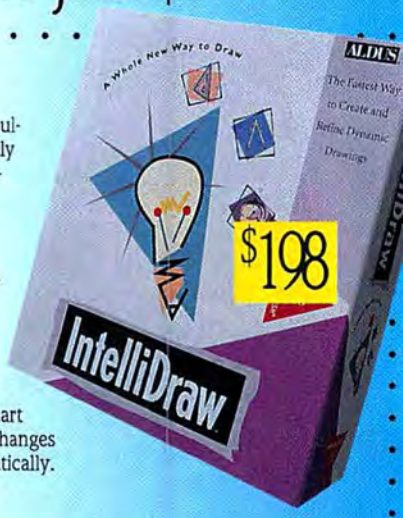

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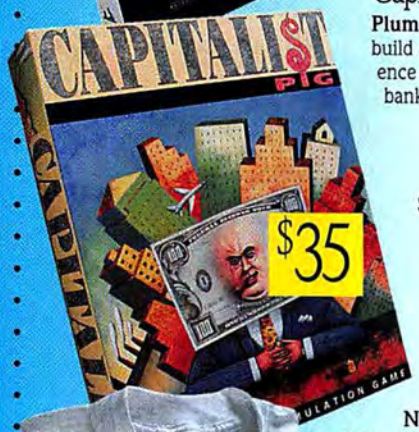

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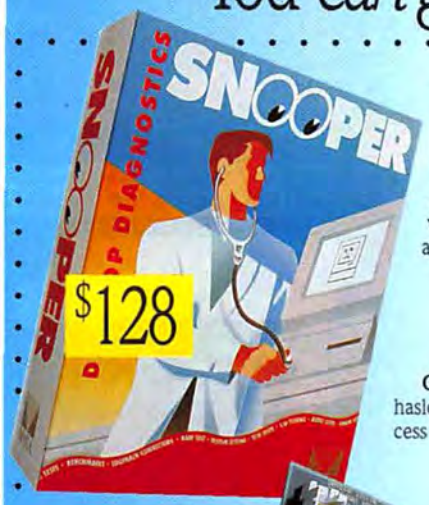

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October 1992

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Premier

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354-358

Classified

Flexible-format display advertising that offers diverse sizes plus two and three color options. Section meets dynamic advertising needs for all Macintosh products and services.

359-375

Business Card

A forum for innovative, unique, low-cost and hard-to-find Macintosh hardware, software and miscellaneous products and services.

376-377

Product Categories

	Premier	Classified	BusinessCard
Hardware			
Accelerator Boards	354		
Bar Coding		359	
CD-Rom			
Communications			
Computer Systems	354	359	
Data Acquisition			
Data Recovery Services		363	376
Disk Drives	355	364	
Diskettes		364	
General		364	
Input Devices			
Insurance		364	376
Memory Upgrades		364	
Networking			
Peripherals		367	
Power Supplies		370	
Printers			
Scanners	356		376
Security			
Tape Drives			376
Used Equipment			
Software			
Accounting			376
Bar Coding	356	371	
Business	356	371	376
Business Time Management			
CAD/CAM		371	
CD-ROM	356	372	376
Communications/Networking		371	
Desktop Publishing		371	
Educational		371	376
Emulation		373	
Engineering		373	
Entertainment/Games	357	373	376
Financial			
Fonts		373	377
Foreign Languages	357	373	
Genealogy		373	
General			377
Government			
Graphics		373	
Health			
Language Tools			
Legal			
Lottery			377
Medical/Dental			377
Music/MIDI	357	374	
Networking			
Personal Management			
Programming Tools			
Public Domain		374	
Real Estate			377
Recreation			377
Religion	357		
Sales Marketing			
Scientific		374	377
Security			
Shareware		374	
Stackware			
Statistics			
Taxes			
Utilities			
Miscellaneous			
Accessories	358	375	
Books/Catalogues			
Business Opportunities			
Consulting/Programming			377
Data Conversion Services		375	
Desktop Publishing Services		375	377
Diskette Copy Services			
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Novelties			
Services/Repair		375	377
Slide Imaging Services	358	375	
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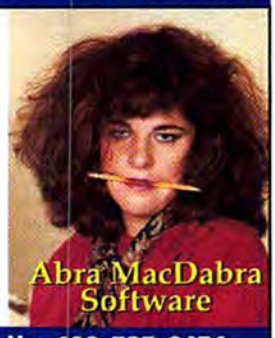

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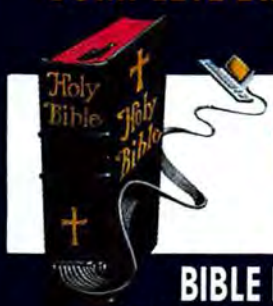

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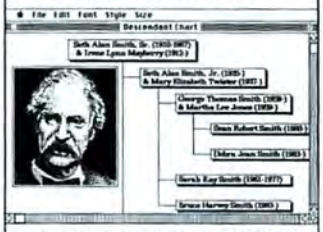

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Hail to the Chief

Is John Sculley ready to be put out to pasture? An exclusive interview reveals where Apple might go with some new blood.

Rumor has it that John Sculley is sick and tired of running Apple and wants to retire to his horse farm in Maine, where he won't have to talk much, except to the horses, who will nod with approval at whatever he says. Of course, horses always nod with approval, as do many of today's sycophantic employees.

Sculley is getting the media ready for this break by inviting a slew of movers and shakers to his outpost in Maine for a day. (Note: I wasn't invited. I'm on the wet-blanket list when it comes to these events. Go figure!)

In addition to providing an opportunity to see Sculley in blue jeans standing next to a faithful steed, this event functions as a scam to keep nonexistent Newton devices and other vaporware fresh in the minds of users by coercing writers and editors to churn out fawning fluff pieces. Of course, none of this will do much for Apple's sales, but it'll make the PR people and the executives feel good.

No matter. As far as I'm concerned, the scene at Apple is getting old. I'd love to see Sculley retire and make way for some changes there that would actually benefit the community at large. Here's my wishful-thinking interview with the new CEO of Apple, Sam Goodguy.

Dvorak: Sam, first of all, thanks for granting me this interview. Apple has a reputation for arrogance, stemming from the Steve Jobs era, that hasn't completely dissipated. What's going to change with you as boss?

Goodguy: I'm going to fire anyone who doesn't think the customer is always right. Anyone who treats the customer as an idiot is out of here.

Dvorak: What about pricing the Mac? Are you going to cut margins at all?

Goodguy: I'm going to start a new line of inexpensive Macintoshes but keep margins high. Apple has been very conservative about acquisitions, even though we have tons of cash. Why are we keeping this cash in the bank? Are we saving it for college? We're going to buy some semiconductor manufacturers and put the Macintosh onto a three-chip set. The Macintosh II architecture will be put onto an IBM PC adapter card. The Macintosh II will be in the traffic signals at Long Beach. It'll be everywhere. The home Macintosh II will sell for $499 and have the power of today's Macintosh IIfx. The desktop and workstation machines will be based on the Quadra designs for now, and we'll drop all that old Mac Classic crap completely.

Dvorak: I've always believed that more integration and lower prices would also keep the Apple II alive. What about that?

Goodguy: Absolutely. The old Apple II can be put onto three chips and sold for $49, and that's what we're going to do. It'll be turned into a Game Boy and a home game machine and a home computer. Why this wasn't done during the Apple II's heyday mystifies me. Look at what Nintendo did with its $99 machine! It sold billions of dollars worth of these things. We have to rethink our archaic '70s strategies.

Dvorak: So what about Newton and all this new stuff?

Goodguy: I'm worried about competing with Casio and the Japanese lowballers. I don't see much future in these things.

Dvorak: You don't see it as a multitrillion-dollar business?

Goodguy: Gosh, no way!

Dvorak: What about the on-again, off-again relationship with Microsoft?

Goodguy: I don't like our relationship with Microsoft. In fact, I don't get it. They make a product called Windows that is a threat to our business, yet we keep jumping into the sack with them. They're trying to take sales away from ClarisWorks, and they screwed us out of our Mac BASIC product. They want to break us on the one hand but profit from us on the other. We don't even need them except for their Excel spreadsheet program. I'm going to promote the Claris Resolve spreadsheet program, subsidize other companies that have spreadsheet programs, and stop catering to Microsoft unless they get out of the business of competing with us. Let Microsoft stay with its Windows group; I don't even think we should encourage them to develop for our platform.

Dvorak: Anything else you want to add? Is there anything you're going to do that is like the way Apple used to do it?

Goodguy: Well, I'm still wondering about those silly business-card titles. Are they a good idea? I don't know. The main thing I'm going to do is reintroduce free juice company-wide: orange juice, kiwi juice, guava juice. I'm also going to buy a hotel to be owned and operated by Apple on the Hawaiian islands for employees and members of the media to use at their convenience. How's that sound?

Dvorak: Sounds great!

Well, I can always *hope*, can't I?

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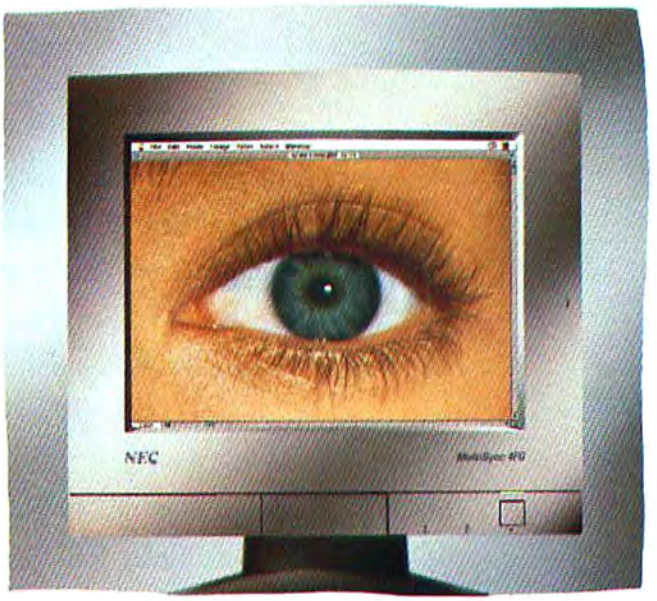

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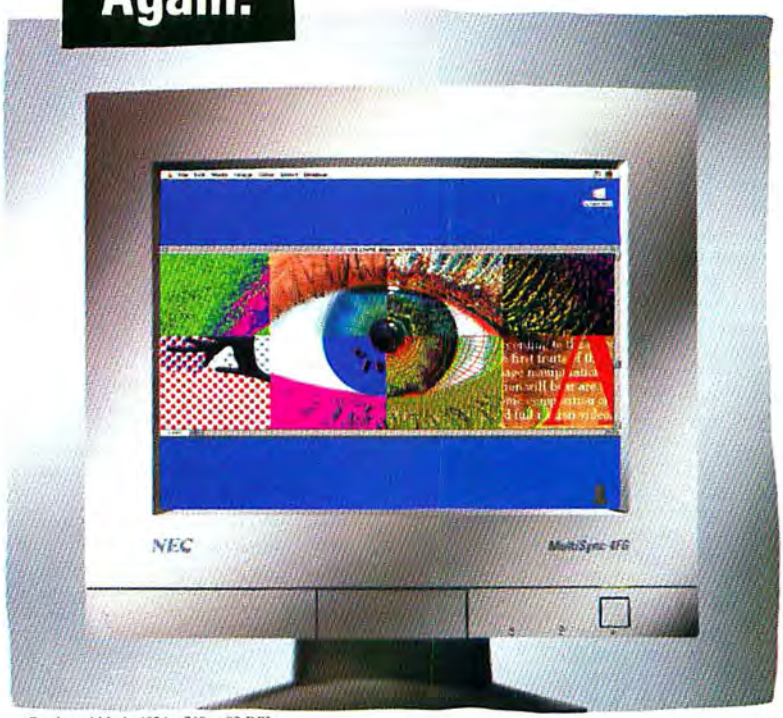

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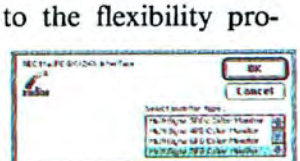

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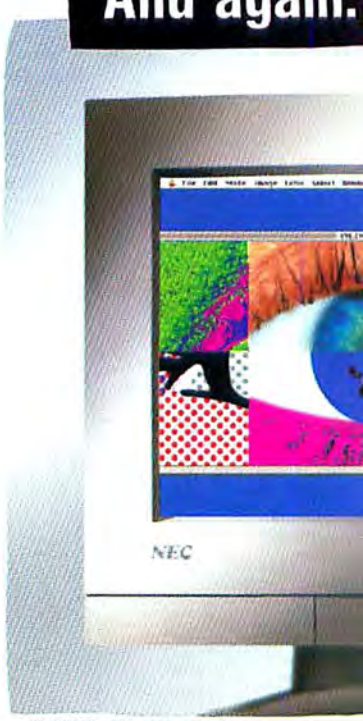

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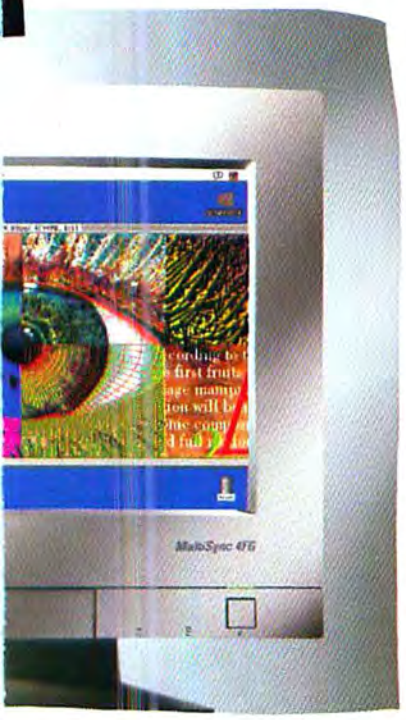

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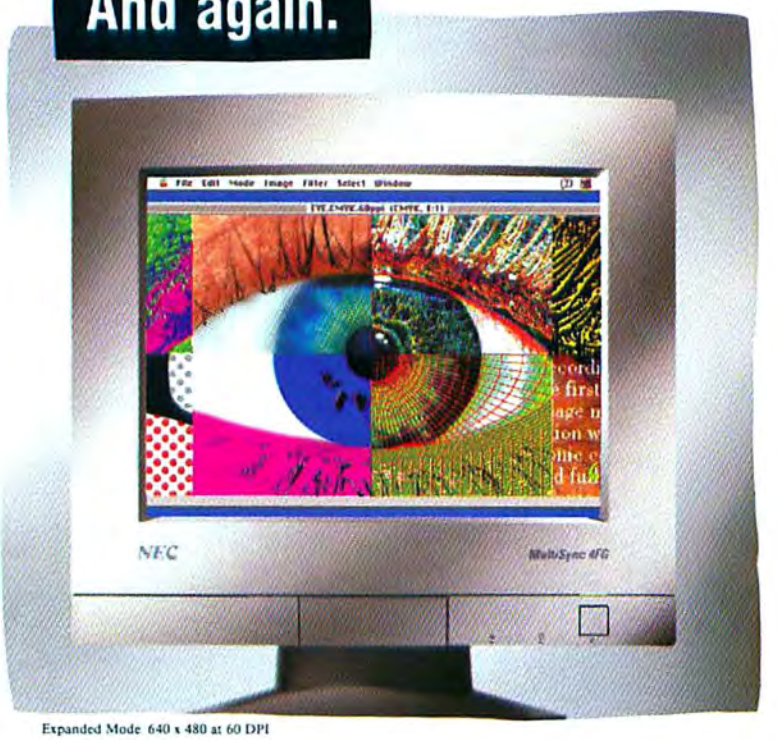

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